APPENDIX C

FINDINGS OF SURVEYS FOR WETLANDS, TERRESTRIAL ANIMALS, RARE PLANTS, BASELINE NOISE, AND RADIOLOGICAL CONTAMINATION

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix C contains the survey findings for wetland delineation, sensitive terrestrial animals, rare plants, baseline noise monitoring (draft report), and radiological contamination prepared by the Bechtel Jacobs Company Environmental Management Team and Foster Wheeler Environmental Corporation for the proposed Transuranic Waste Treatment Project site.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C.1

FINDINGS OF WETLAND DELINEATION ON THE PROPOSED TRU WASTE FACILITY SITE

THIS PAGE INTENTIONALLY LEFT BLANK

FINDINGS OF WETLAND DELINEATION ON THE PROPOSED TRANSURANIC WASTE FACILITY SITE IN MELTON VALLEY, OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE

August 25, 1999

prepared for:

Bechtel Jacobs Company LLC
under contract DE-AC05-98OR22700

prepared by:

Jacobs Environmental Management Team
and
Barbara A. Rosensteel
Wetlands and Watersheds Consulting

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

FIGURE

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

Executive Order 11990 (May 24, 1977), Protection of Wetlands, requires federal agencies to avoid, to the extent possible, adverse impacts associated with the destruction and modification of wetlands, and that they avoid direct and indirect support of wetlands development when there is a practicable alternative. In accordance with U.S. Department of Energy (DOE) Regulations for Compliance with Floodplains and Wetlands Environmental Review Requirements [10 *Code of Federal Regulations* (CFR) 1022.11], wetlands on the proposed Transuranic (TRU) Waste Treatment Facility Site (the site) in Melton Valley were identified and the jurisdictional boundaries determined. As required by the Energy and Water Development Appropriations Act of 1992, wetlands were identified using the criteria and methods set forth in the *Wetlands Delineation Manual* [U.S. Army Corps of Engineers (USACE) 1987]. Wetlands identified in this survey were classified according to the system developed by Cowardin et al. (1979) for wetland and deepwater habitats of the United States.

The site is a wooded area immediately west of the Oak Ridge National Laboratory (ORNL) hydrofracture facility. The majority of the site consists of a second-growth forest stand dominated by Virginia pine, oaks, and other hardwoods on moderate slopes. An upgrade of the Melton Valley Access Road is being constructed at the northern boundary of the site and some land has been cleared in that area. An intermittent, headwater stream flows along the eastern boundary of the site, immediately outside of the hydrofracture facility fence. Another intermittent stream is located at the western site boundary. The site drains to White Oak Creek near the head of White Oak Lake.

One small wetland was delineated on the site (wetland B) and two other wetlands were delineated beyond the southern boundary of the site (wetlands A and C). The boundary of an additional wetland, located on the site, (wetland D) was recently delineated for the Melton Valley Road Upgrade project and, thus, was not re-delineated during wetland delineation of the site. However, a description of wetland D, based on data collected during an April 1992 field survey by B. Rosensteel, is included in this report.

Wetland A is located in the riparian zone of the western site boundary intermittent stream beyond the southwest corner of the TRU Waste Facility site. Wetland B is a very small wetland located in the riparian zone of the intermittent stream within the eastern boundary of the site. Wetland C is in a seep area in a maintained, grassy area outside of the hydrofracture facility fence beyond the southeast corner of the TRU Waste Facility site. Wetland D is located in the riparian zone of the western site boundary stream in a small section between the "old" and recently upgraded portion of Melton Valley Road. All of the wetlands delineated during this survey are located in areas of prior disturbance.

2. WETLAND DELINEATION METHOD

Wetland determination was performed using the USACE methodology (1987). According to this methodology, three parameters—hydrophytic vegetation, hydric soils, and wetland hydrology—must be present for an area to be identified as a wetland. With the exception of certain atypical or problem situations, an area must possess all of the following attributes to be positively identified as a wetland:

1. The vegetation is characterized by a prevalence of macrophytes typically adapted to wetland soil and hydrological conditions. Hydrophytic vegetation is considered to be present when greater than 50 percent of the vegetation in each strata have an indicator status of obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) (USFWS 1996 revised).

2. The substrate is undrained hydric soil. Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in a major part of the root zone. Several indicators, including soil color and presence of mottles, are used to determine if a soil is hydric.

3. The area is inundated either permanently or periodically at depths less than 6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation. Evidence includes direct observations of inundation or soil saturation and indirect observations such as flood drift lines and silted leaf litter.

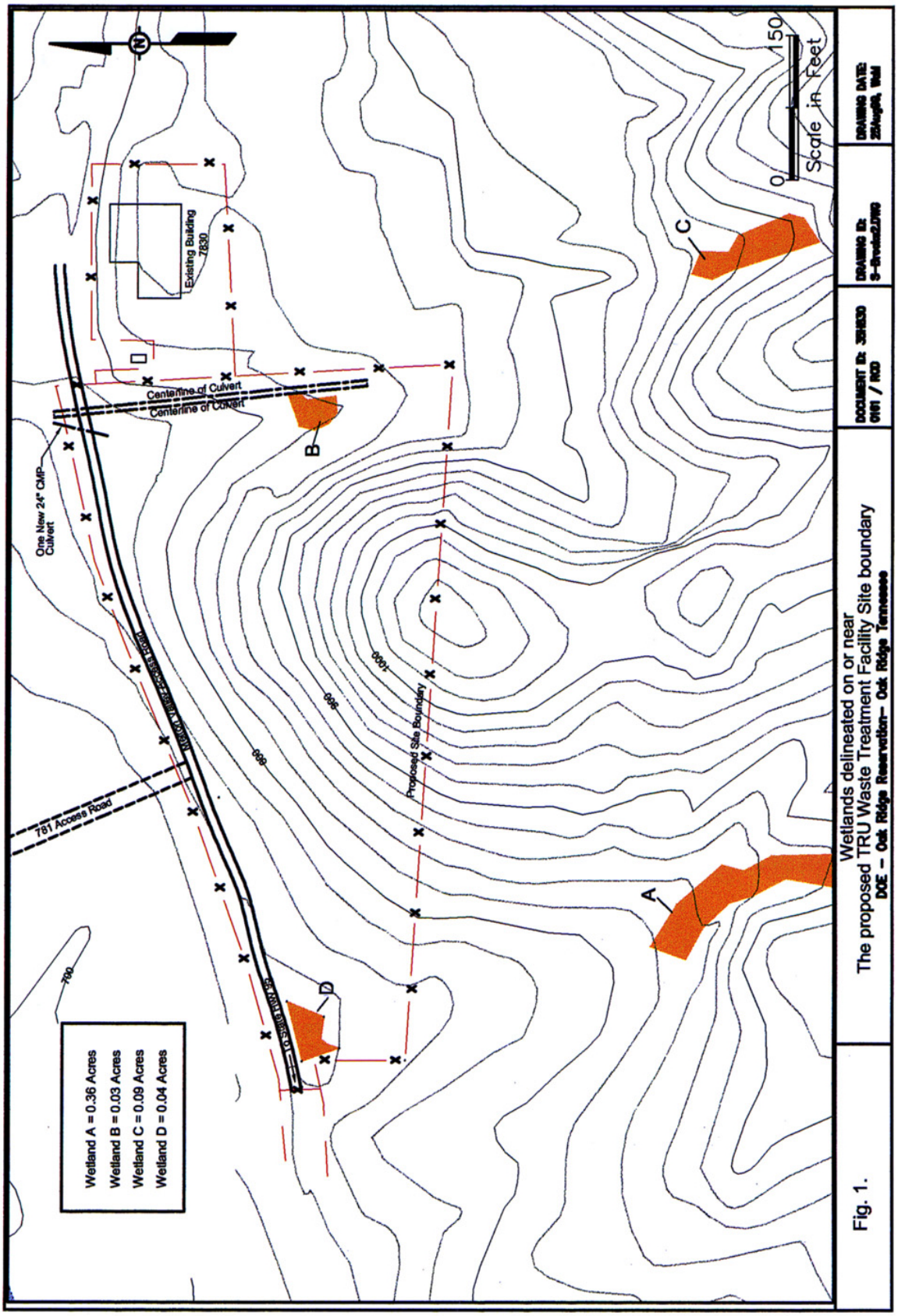
Wetlands described in this report have been classified according to the system developed by Cowardin et al. (1979). This hierarchical system describes wetlands by system, class, and subclass. Additional modifiers are added for hydrologic regime, soil, and disturbances. The majority of the wetlands in the region of the Oak Ridge Reservation (ORR) are in the palustrine system (indicated by the letter "P"), and in either the forested (FO), scrub-shrub (SS), or emergent (EM) classes. The number "1" following these designations indicates broad-leaved deciduous vegetation (in the FO and SS classes), and vegetation with parts that persist aboveground after the growing season (in the EM class). The typical water regime modifiers for wetlands on the ORR are temporarily flooded (A), saturated (B), seasonally flooded (C), semipermanently flooded (F), and permanently flooded (H).

3. WETLAND DELINEATION FINDINGS

Four small wetlands have been identified and delineated on or adjacent to the site (Fig. 1). Wetlands A, B, and C were delineated during the current field survey. Wetland D was initially identified by B. Rosensteel during an April 1992 field survey (Martin Marietta Energy Systems, Inc. internal correspondence from B. Rosensteel to R. Saylor) and others recently delineated the wetland boundary for the Melton Valley Access Road upgrade. Data for each wetland is presented in a modification of the USACE routine wetland determination data sheets (USACE 1987) in Appendix A. Data presented for wetland D was collected during the April 1992 survey. Although, data was not collected for wetland D during the current work, visual observation of this wetland during the current survey confirmed that wetland criteria are still present.

Wetland A is a saturated and temporarily flooded, palustrine emergent wetland (PEM1A/B) located in a clearing in the intermittent stream drainage beyond the southwestern corner of the site. The stream begins farther upslope near the base of Copper Ridge and flows through a clearing where wetlands have developed around seeps that contribute to stream flow. In the wetland, water flow is across the surface and through shallow channels. At the northern end of the wetland, the diffuse surface and subsurface flows converge in a well-defined, steep-banked reach of the stream. On the day of the delineation, there was water flowing across the surface, the soil was saturated throughout the wetland, and there was free water in several of the soil borings at a depth less than 10 in. from the surface. A small portion of the downslope end of the wetland extends into a wooded area along the stream and includes an area around a wellhead.

The dominant vegetation species include sweetflag (*Acorus calamus*; OBL), mountain mint (*Pycnanthemum* sp.), shrubby St. Johns wort (*Hypericum densiflorum*; FACW-), soft rush (*Juncus effusus*; FACW+), microstegium (*Microstegium vimineum*; FAC), and poison ivy (*Toxicodendron radicans*; FAC). Other commonly occurring species include silky dogwood (*Cornus amomum*; FACW+); saplings of box elder (*Acer negundo*; FACW), green ash (*Fraxinus pennsylvanica*; FACW), and black willow (*Salix nigra*; OBL); monkey flower (*Mimulus ringens*; OBL); bugleweed (*Lycopus virginicus*; OBL); cattail (*Typha latifolia*; OBL); *Juncus biflorus*; FACW+; and an unidentified grass (*Panicum* sp.) Soil examined from several locations in the wetland exhibited a low chroma color matrix, mottles, and oxidized rhizospheres.


Wetlands delineated on or near
The proposed TRU Waste Treatment Facility Site boundary
DOE – Oak Ridge Reservation– Oak Ridge Tennessee
Fig. 1.
Wetland A = 0.36 Acres
Wetland B = 0.03 Acres
Wetland C = 0.09 Acres
Wetland D = 0.04 Acres
Scale in Feet
0
150
Existing Building 7830
Centerline of Culvert
Centerline of Culvert
One New 24" CMP Culvert
781 Access Road
Proposed Site Boundary
A
B
C
D

Surrounding wetland A are upland open-canopy forested areas on the west and south side and a dense sapling-vine thicket on the east side. Vegetation species include red cedar (*Juniperus virginiana*), redbud (*Celtis occidentalis*), red maple (*Acer rubrum*), Virginia pine (*Pinus virginiana*), tulip poplar (*Liriodendron tulipifera*), flowering dogwood (*Cornus florida*), Japanese honeysuckle (*Lonicera japonica*), and blackberry (*Rubus* sp.). These areas, in turn, are flanked by second-growth pine-hardwood forest, which includes Virginia pine, beech (*Fagus americana*), black cherry (*Prunus serotina*), white oak (*Quercus alba*), and tulip poplar.

Wetland B is a very small, temporarily flooded and saturated, palustrine scrub-shrub wetland (PSS1A/B) in an alluvial area in the intermittent stream on the eastern side of the site. The soil is saturated and the wetland may be flooded following rainfall. The primary cause of the riparian zone saturation and flooding is an old road-crossing culvert that is on the downstream side of this wetland area and acts to slow and retain stream flow. The dominant species include sweetgum (*Liquidambar styriciflua*; FAC) and green ash saplings, silky dogwood, sedges (*Carex* spp.; *Scirpus* spp.), and a herbaceous species that could not be identified as it had recently emerged and lacked flowers. The soil included a fine gravel alluvium, and a silt loam with a low chroma matrix, mottles, and partially decomposed plant fragments. The wetland is flanked by the hydrofracture facility to the east and second-growth pine-hardwood forest to the west.

Wetland C is a saturated, palustrine emergent wetland (PEM1B) located in a disturbed, grassy area upslope and outside of the hydrofracture facility fence beyond the southeast corner of the site. Although currently there is no evidence of a stream channel through the wetland area, the wetland is in a topographic low area that may have contained a section of the intermittent stream prior to land disturbance and hydrologic alterations. Water discharges from seeps in the wetland and reenters the ground at the downslope end of the wetland near the fence. The intermittent stream adjacent to the hydrofracture facility fence is a short distance downslope of this wetland, and may receive some of the water that flows through the wetland area. The hydrofracture facility to the north, a continuation of the maintained grassy area to the east, and second-growth pine-hardwood forest to the south and west flank the wetland.

Wetland D is a saturated emergent wetland (PEM1B) located on the stream at the western side of the site, and lies between the old section and recently upgraded section of Melton Valley Access Road. The wetland has developed in a seep area; however, the persistence of wetland hydrology in this small area appears to be at least partially due to the slowing of stream and groundwater flow by a culvert under the old Melton Valley Road. On the day of this field visit, there were standing and flowing water in this wetland. Dominant plant species identified in the April 1992 survey included black willow, soft rush, monkey flower, cattail, fox sedge (*Carex vulpinoidea*; OBL), shallow sedge (*Carex lurida*; OBL), and rice cutgrass (*Leersia oryzoides*; OBL). The soil matrix color was described in May 1992 as dark gray (10YR 4/1) and grayish brown (10YR 5/2) with strong brown (7.5YR 5/8) and very dark gray (10YR 3/1) mottles.

4. SUMMARY

The boundaries of three jurisdictional wetlands (wetlands A, B, and C) were delineated according to the U.S. Army Corps of Engineers criteria on the site in Melton Valley April 20, 1999. An additional wetland (wetland D) had been initially identified in April 1992 by B. Rosensteel, and the boundary recently rechecked by the Tennessee Department of Environment and Conservation for the Melton Valley Access Road upgrade.

Wetland A is a palustrine emergent wetland (PEM1A/B) located in a seep area in an intermittent stream drainage beyond the southwest corner of the project site boundary. Wetland B is a very small scrub-shrub wetland (PSS1A/B) in an alluvial area in an intermittent stream near the eastern site boundary, just outside of the existing hydrofracture facility fence. Wetland C is an isolated, emergent wetland (PEM1A/B) in a previously disturbed, grassy area upslope and outside of the existing hydrofracture facility fence beyond the southeast corner of the site. Wetland D is located in the riparian zone of an intermittent stream in the northwest corner of the site, in a small stream section situated between the "old" and the recently upgraded portion of Melton Valley Access Road. All of the wetlands occur in previously cleared and disturbed areas. Wetland C continues to receive occasional disturbance from periodic mowing.

5. REFERENCES

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetland and deepwater habitats of the United States. FWS/OBX-79/31. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Army Corps of Engineers. 1987. Wetlands Delineation Manual. Technical Report Y-87-1. Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Fish and Wildlife Service. 1996. Draft revision of the National List of Plant Species that Occur in Wetlands.

Martin Marietta Energy Systems internal correspondence from B. Rosenteel to R. Saylor. May 1992. "Wetland delineation report—RHTRU Waste Storage Bunker."

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A
WETLAND DETERMINATION DATA FORMS

THIS PAGE INTENTIONALLY LEFT BLANK

Wetland Delineation Data Sheets

Project site: TRU Facility Site, Oak Ridge Reservation Date: 20 April 1999

State: TN County: Anderson

Wetland ID: Wetland A Location: Clearing in seep area around intermittent stream

Wetland Class: PEM1A/B

VEGETATION

SPECIES	Indicator Status	SPECIES	Indicator Status
TREES AND SAPLINGS		**HERBACEOUS and VINES**	
Acer negundo	FACW+	Acorus calamus	OBL
Fraxinus pennsylvanica	FACW	Pycnanthemum sp.	
Salix nigra	OBL	Juncus effusus	FACW+
SHRUBS		Toxicodendron radicans	FAC
Cornus amomum	FACW+	Juncus biflorus	FACW+
Rubus sp. (blackberry)		Lycopus virginicus	OBL
		Eulalia viminea	FAC

% of species that are OBL, FACW, and/or FAC: 100%

Hydrophytic Vegetation: YES

SOILS

Depth	Matrix	Mottles	Texture/Other
0-9"	10YR 5/1	7.5YR 4/6	Silty clay loam
9-12"	10YR 5/1	7/5YR 4/6	Clay loam
0-7"	10YR 3/1		Very silty loam
7-12"	10YR 5/1		Gravelly silt loam
0-9"	10YR 5/1	7.5YR 4/6	Silt loam

Hydric Soils: YES Basis: Low chroma matrix and mottles

HYDROLOGY

Inundated:	Partially	Water depth: 1-3" flowing water	
Saturated:	Yes	Depth to saturated soil:	Saturated to surface
Other indicators:	Oxidized rhizospheres		

Wetland Hydrology: YES

Atypical Situation: NO Normal Circumstances: YES

Is this a Jurisdictional Wetland?: YES

Comments:

Determined by: B. A. Rosensteel, PWS

Wetland Delineation Data Sheets

Project site: TRU Facility Site, Oak Ridge Reservation		Date: 20 April 1999	
State: TN	County: Anderson		
Wetland ID: Wetland B			
Wetland Class: PFO1A/B	Location:	Small alluvial area on intermittent stream	
VEGETATION			
SPECIES	**Indicator Status**	**SPECIES**	**Indicator Status**
TREES AND SAPLINGS		**HERBACEOUS and VINES**	
Liquidambar styriciflua	FAC	Sedges (could not be identified to species due to immaturity of specimens)	Unknown, but likely to be OBL or FACW
Fraxinus pennsylvanica	FACW		
SHRUBS			
Cornus amomum	FACW+	Unidentified herbaceous species - could not be identified due to immaturity of specimens)	Unknown
% of Dominant Species that are OBL, FACW, and/or FAC: **100% in tree/shrub strata; Uncertain in herbaceous strata.**		**Hydrophytic Vegetation: YES**	

SOILS			
Depth	Matrix	Mottles	Texture/Other
0-9"	10YR 5/2	7.5YR 4/6	silt loam containing partially decomposed plant material
Hydric Soils: YES		Basis: Low chroma matrix with mottles	

HYDROLOGY			
Inundated:	Partially	Water depth: flowing water in stream; water in soil boring at 3" near wetland outer edge.	
Saturated:	Yes		
Other indicators:	Oxidized rhizospheres	Depth to saturated soil:	Saturated to surface
Wetland Hydrology: YES			

Atypical Situation: NO Normal Circumstances: YES

Is this a Jurisdictional Wetland?: Yes

Comments:

Determined by: B. A. Rosensteel, PWS

Wetland Delineation Data Sheets

Project site: TRU Facility Site, Oak Ridge Reservation Date: 20 April 1999
State: TN County: Anderson
Wetland ID: Wetland C
Wetland Class: PEM1B Location: Isolated seeps in maintained grassy area

VEGETATION

SPECIES	**Indicator Status**	**SPECIES**	**Indicator Status**
TREES AND SAPLINGS		**HERBACEOUS and VINES**	
Salix nigra	OBL	Festuca arundinacea	FAC-
Liquidambar styriciflua	FAC	Juncus effusus	FACW+
		Sedges (could not be identified to species due to immaturity of specimens)	Likely to be FACW or OBL
SHRUBS			
None		Scirpus cyperinus	OBL
		Typha latifolia	OBL
		Mimulus ringens	OBL

% of Dominant Species that are OBL, FACW, and/or FAC: 100%

Hydrophytic Vegetation: YES

SOILS

Depth	Matrix	Mottles	Texture/Other
0-8"	10YR 4/1		Oxidized rhizospheres
0-8"	2.5Y 5/2	7/5YR 4/6	Oxidized rhizospheres

Hydric Soils: YES Basis: Low chroma matrix and mottles in most samples

HYDROLOGY

Inundated:	No	Water depth: 1-3" flowing water	
Saturated:	Yes	Depth to saturated soil:	Saturated to surface
Other indicators:	Oxidized rhizospheres		

Wetland Hydrology: YES

Atypical Situation: NO Normal Circumstances: YES

Is this a Jurisdictional Wetland?: YES

Comments: This area, possibly including a headwater stream, was altered in the past. The soil may consist partially or wholly of fill soils. The wetland in isolated in that seeps discharge water which then re-enters the soil at the downslope end of the wetland before reaching a stream or other surface water. It is on a slope in a grassed area that is maintained by periodic mowing.

Determined by: B. A. Rosensteel, PWS

Wetland Delineation Data Sheets

Project site: TRU Facility Site, Oak Ridge Reservation Date: April 1992

State: TN County: Anderson

Wetland ID: Wetland B Location: Riparian seep area between the old and new Melton Valley Road

Wetland Class: PEM1A

VEGETATION

SPECIES	**Indicator Status**	**SPECIES**	**Indicator Status**
TREES AND SAPLINGS		**HERBACEOUS and VINES**	
Salix nigra	OBL	Typha latifolia	OBL
		Leersia oryzoides	OBL
		Carex lurida	OBL
SHRUBS		Juncus effusus	FACW+
		Carex vulpinoidea	OBL
		Mimulus ringens	OBL

% of Dominant Species that are OBL, FACW, and/or FAC: 100%

Hydrophytic Vegetation: YES

SOILS

Depth	Matrix	Mottles	Texture/Other
	10YR 4/1	7.5YR 5/8 10YR 3/1	

Hydric Soils: YES Basis: Low chroma matrix with mottles

HYDROLOGY

Inundated:	Partially	Water depth: flowing water in stream; water in soil
Saturated:	Yes	boring within a few inches of surface
Other indicators:		Depth to saturated soil: Saturated to surface

Wetland Hydrology: YES

Atypical Situation: NO Normal Circumstances: YES

Is this a Jurisdictional Wetland?: Yes

Comments: This wetland area was initially identified in April 1992 by B. Rosensteel and the boundary recently delineated by others. Data is from 1992 survey.

Determined by: B. A. Rosensteel, PWS

APPENDIX C.2

FINDINGS OF SURVEY FOR SENSITIVE TERRESTRIAL ANIMAL SPECIES AT THE PROPOSED TRU WASTE FACILITY SITE

THIS PAGE INTENTIONALLY LEFT BLANK

FINDINGS OF THE SURVEY FOR SENSITIVE TERRESTRIAL ANIMAL SPECIES AT THE PROPOSED TRANSURANIC WASTE TREATMENT FACILITY SITE IN MELTON VALLEY, OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE

August 25, 1999

prepared for:

Bechtel Jacobs Company LLC
under contract number DE-AC05-98O22700

prepared by:

Jacobs Environmental Management Team
and
Wayne H. Schacher

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

Approximately five acres have been identified as a lease parcel for a proposed Transuranic (TRU) Waste Treatment Facility (the site) in Melton Valley at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. A survey for sensitive terrestrial animal species on the Oak Ridge Reservation (ORR) was conducted in 1996, but did not cover the site (ORNL/ER/TM-188/R1 1996). Complete and accurate identification of all resources on the site is needed to support proper planning, documentation, and management of the site. A survey of sensitive terrestrial animal species at the site will complete this requirement for animals.

1.1 DESCRIPTIVE OVERVIEW OF HABITAT

Past disturbance within the 5-acre land parcel proposed for the site near Oak Ridge, Tennessee has shifted cover type vegetation toward younger woodland compositions, with sections of the parcel in early successional, herbaceous vegetation.

Woodland habitats are present on knolls, ridges and more upland areas. Existing cover types that would be suitable for sensitive terrestrial animal species include woodlands with a deciduous oak-hickory composition; transitional woodlands with a mixture of deciduous, pine (shortleaf, white and loblolly) species, and small cedars in the canopy; and pine-dominant woodlands. Each of these cover types is composed of young to mid-age trees with DBH rarely in excess of 1.5 ft. No hollow trees living or dead were observed on the parcel.

Areas of closed canopy and partially open canopy are present in woodlands, and both deciduous and coniferous species are present in the subcanopy and understory. A thin layer of deciduous leaf litter accompanies slash, moss-covered surface debris and small rocks on the soil surface. The soil surface is firm and gravelly, with a minimal buildup of organic matter. Some rotting stumps and logs are present. Beneath breaks in the woodland canopy, and along an old logging road, herbaceous vegetation forms the ground cover. No caves or large rock outcrops are present in the parcel.

Small, ephemeral streams flow down slope from the wooded uplands toward the access road. One stream is partially blocked by a logging road mid-way down slope, and forms a small wet habitat with herbaceous ground cover within the woodland. Downstream of this wet habitat, the stream channel is defined, with silt, gravel, rootwads and small rocks. The second stream flows from the woodland through a disturbed, slash and early successional habitat to form a pool of standing water resulting from the access road bed. This small, open-water impoundment creates a wetland appearance, and contains young growths of water-tolerant tree (black willow) and herbaceous (rushes) species.

2. METHODS

An initial terrestrial survey was conducted on April 20, 1999, to characterize land use, cover type and habitat contained within the 5-acre site. Field notes indicating general habitat types were made, and specific habitat locations were noted on field maps. Notations indicated the presence or absence of unique features (rock outcrops, hollow trees), communities (canebrakes, seeps, streams, wetlands) or quality habitat types (mature woodlands, old fields, etc.).

2.1 SPECIES POTENTIALLY PRESENT ON SITE

This information was used to evaluate habitats present on the site and their relative suitability to support state and federally listed terrestrial animal species (Table 1). These assessments resulted in identification of targeted sensitive species in the four vertebrate classes that could occur on the site. A narrative of these sensitive species that could be present, a discussion of its habitat requirements relevant to the site, and indication of survey methods that were employed to determine its presence or absence from the site follows Table 1.

2.2 SITE HABITAT SUITABILITY FOR SPECIES POTENTIALLY PRESENT

Following the initial survey, "suitable habitat" determinations were projected for sensitive (Tennessee or federal classifications) terrestrial animal species in the Classes Amphibia, Reptilia, Aves and Mammalia. These projections were based upon the geographical range of the species being inclusive of lands in Melton Valley, and the existence of habitat deemed suitable for the respective species (Harvey 1992; Choate, Jones and Jones 1994; Wilson 1995; Redmond and Scott 1996; Nicholson 1997; Whitaker and Hamilton 1998).

Amphibia

Hemidactylium scutatum (four-toed salamander)—Tennessee 'In Need of Management'

Habitat for this species includes woodland swamps, shallow ponds, sphagnum bogs, and slow-moving streams with abundant moss, sedges or similar herbaceous growth, adjacent to woodlands. Habitat existing on the site was considered to be "marginal." Potential habitats include the small woodland streams present, the low, wet, wooded and herbaceous depressions and the herbaceous wetland near the main access road. Survey methods employed were qualitative searches, use of artificial ground covers and construction of drift fence and pitfall arrays.

Table 1. State and federally listed terrestrial animal species in Tennessee, with projected geographic range and habitat suitability relationships for the TRU parcel

Scientific name	Common name	TN Status	In geographic range	Suitable habitat present
CLASS AMPHIBIA				
AMBYSTOMA TALPOIDEUM	SALAMANDER	NMGT	NO	
CRYPTOBRANCHUS A. ALLEGANIENSIS	EASTERN HELLBENDER	NMGT	YES	NO
DESMOGNATHUS AENEUS	SEEPAGE SALAMANDER	NMGT	NO	
DESMOGNATHUS QUADRAMACULATUS	BLACK-BELLIED SALAMANDER	NMGT	NO	
DESMOGNATHUS WELTERI	BLACK MOUNTAIN SALAMANDER	NMGT	YES	NO
DESMOGNATHUS WRIGHTI	PIGMY SALAMANDER	NMGT	NO	
EURYCEA JUNALUSKA	JUNALUSKA SALAMANDER	NMGT	NO	
GYRINOPHILUS PALLEUCUS	TENNESSEE CAVE SALAMANDER	THR	NO	
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER	NMGT	YES	MARGINAL
HYLA GRATIOSA	BARKING TREEFROG	NMGT	NO	
PLETHODON WEHRLEI	WEHRLE'S SALAMANDER	NMGT	NO	
PLETHODON WELLERI	WELLER'S SALAMANDER	NMGT	NO	
RANA CAPITO	GOPHER FROG	POTL	NO	
CLASS AVES:				
ACCIPITER COOPERII	COOPER'S HAWK	NMGT	YES	YES
ACCIPITER STRIATUS	SHARP-SHINNED HAWK	NMGT	YES	YES
AEGOLIUS ACADICUS	NORTHERN SAW-WHET OWL	NMGT	WINTER ONLY	NO
AIMOPHILA AESTIVALIS	BACHMAN'S SPARROW	END	YES	MARGINAL
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	NMGT	YES	MARGINAL
ANHINGA ANHINGA	ANHINGA	NMGT	MARGINAL	NO
AQUILA CHRYSAETOS	GOLDEN EAGLE	THR	WINTER ONLY	NO
CASMERODIUS ALBUS	GREAT EGRET	NMGT	YES	NO
CHONDESTES GRAMMACUS	LARK SPARROW	THR	YES	MARGINAL
CIRCUS CYANEUS	NORTHERN HARRIER	NMGT	WINTER ONLY	FORAGE ONLY
CONTOPUS BOREALIS	OLIVE-SIDED FLYCATCHER	NMGT	NO	
CORVUS CORAX	COMMON RAVEN	THR	NO	
EGRETTA CAERULEA	LITTLE BLUE HERON	NMGT	YES	NO
EGRETTA THULA	SNOWY EGRET	NMGT	YES	NO

Table 1. State and federally listed terrestrial animal species in Tennessee, with projected geographic range and habitat suitability relationships for the TRU parcel (continued)

Scientific name	Common name	TN Status	In geographic range	Suitable habitat present
FALCO PEREGRINUS	PEREGRINE FALCON	END / LE	YES	NO
GRUS CANADENSIS	SANDHILL CRANE	NMGT	WINTER ONLY	NO
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	THR / LT	YES	NO
ICTINIA MISSISSIPPIENSIS	MISSISSIPPI KITE	NMGT	NO	
IXOBRYCHUS EXILIS	LEAST BITTERN	NMGT	YES	
LIMNOTHLYPIS SWAINSONII	SWAINSON'S WARBLER	NMGT	YES	NO
PANDION HALIAETUS	OSPREY	THR	YES	NO
PHALACROCORAX AURITUS	DOUBLE-CRESTED CORMORANT	NMGT	YES	NO
PICOIDES BOREALIS	RED-COCKADED WOODPECKER	END / LE	MARGINAL	NO
POOECETES GRAMINEUS	VESPER SPARROW	NMGT	YES	MARGINAL
RALLUS ELEGANS	KING RAIL	NMGT	YES	NO
SPHYRAPICUS VARIUS	YELLOW-BELLIED SAPSUCKER	NMGT	WINTER ONLY	YES
STERNA ANTILLARUM	LEAST TERN	END	NO	
THRYOMANES BEWICKII ALTUS	APPALACHIAN BEWICK'S WREN	THR	NO	
THRYOMANES BEWICKII BEWICKII	BEWICK'S WREN	THR	YES	MARGINAL
TYTO ALBA	COMMON BARN-OWL	NMGT	YES	FORAGE ONLY
CLASS REPTILIA:				
ANOLIS CAROLINENSIS	GREEN ANOLE	NMGT	MARGINAL	NO
CLEMMYS MUHLENBERGII	BOG TURTLE	THR / LT	NO	
EUMECES A. ANTHRACINUS	NORTHERN COAL SKINK	NMGT	MARGINAL	MARGINAL
EUMECES ANTHRACINUS PLUVIALIS	SOUTHERN COAL SKINK	NMGT	MARGINAL	MARGINAL
MACROCLEMYS TEMMINCKII	ALLIGATOR SNAPPING TURTLE	NMGT	NO	
NERODIA CYCLOPION	MISSISSIPPI GREEN WATER SNAKE	NMGT	NO	
OPHISAURUS ATTENUATUS	EASTERN SLENDER GLASS LIZARD	NMGT	YES	YES
PITUOPHIS M. MELANOLEUCUS	NORTHERN PINE SNAKE	THR	YES	MARGINAL
SISTRURUS MILIARIUS STRECKERI	WESTERN PIGMY RATTLESNAKE	THR	NO	

Table 1. State and federally listed terrestrial animal species in Tennessee, with projected geographic range and habitat suitability relationships for the TRU parcel (continued)

Scientific name	Common name	TN Status	In geographic range	Suitable habitat present
CLASS MAMMALIA:				
CANIS RUFUS	RED WOLF	END / NX	NO	
CONDYLURA CRISTATA PARVA	STAR-NOSED MOLE	NMGT	MARGINAL	MARGINAL
CORYNORHINUS RAFINESQUII	EASTERN BIG-EARED BAT	NMGT	YES	MARGINAL
FELIS CONCOLOR	MOUNTAIN LION	END / LE	HISTORICAL	NO
GLAUCOMYS SABRINUS COLORATUS	CAROLINA NOR. FLYING SQUIRREL	END / LE	MARGINAL	NO
LUTRA CANADENSIS	RIVER OTTER	THR*	YES	
MICROTUS CHROTORRHINUS CAROLINENSIS	SOUTHERN ROCK VOLE	NMGT	NO	
MYOTIS GRISESCENS	GRAY BAT	END / LE	YES	NO
MYOTIS LEIBII	EASTERN SMALL-FOOTED BAT	NMGT	YES	MARGINAL
MYOTIS SODALIS	INDIANA MYOTIS	END / LE	YES	MARGINAL
NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	NMGT	MARGINAL	NO
NEOTOMA FLORIDANA HAEMATOREIA	SOU. APPALACHIAN WOODRAT	NMGT	NO	
NEOTOMA FLORIDANA ILLINOENSIS	EASTERN WOODRAT	NMGT	NO	
NEOTOMA MAGISTER	ALLEGHENY WOODRAT	NMGT	YES	NO
PARASCALOPS BREWERI	HAIRY-TAILED MOLE	NMGT	YES	YES
SOREX CINEREUS	COMMON SHREW	NMGT	YES	NO
SOREX DISPAR BLITCHI	LONG-TAILED SHREW	NMGT	YES	NO
SOREX FUMEUS	SMOKY SHREW	NMGT	YES	NO
SOREX LONGIROSTRIS	SOUTHEASTERN SHREW	NMGT	YES	YES
SOREX PALUSTRIS PUNCTULATUS	SOUTHERN WATER SHREW	NMGT	YES	NO
SYNAPTOMYS COOPERI	SOUTHERN BOG LEMMING	NMGT	YES	YES
ZAPUS HUDSONIUS	MEADOW JUMPING MOUSE	NMGT	YES	MARGINAL

LE = Federal, endangered
LT = Federal, threatened
NMGT = Tennessee, In Need of Management
THR = Tennessee, Threatened
END = Tennessee, Endangered
NX = Federal, natural population extirpated
POTL = Tennessee, Potential Listed
PT = Federal, Potential Threatened

Reptilia

Eumeces anthracinus anthracinus (northern coal skink)—Tennessee 'In Need of Management'

Habitat for this species includes humid, mesic wooded or rocky hillsides, usually near water, where it is found under logs, rocks and leaf litter. Habitat existing on the site was considered to be "marginal." Potential habitats include the mixed woodlands on hillsides or wooded knobs near streams. Survey methods employed were qualitative searches, use of artificial ground covers and construction of drift fence and pitfall arrays.

Eumeces anthracinus pluvialis (southern coal skink)—Tennessee 'In Need of Management'

Habitat for this species includes humid, mesic wooded or rocky hillsides, usually near water, where it is found under logs, rocks and leaf litter. Habitat existing on the site was considered to be "marginal." Potential habitats include the mixed woodlands on hillsides or wooded knobs near streams. Survey methods employed were qualitative searches, use of artificial ground covers and construction of drift fence and pitfall arrays.

Ophiosaurus attenuatus longicaudus (eastern slender glass lizard)—Tennessee 'In Need of Management'

Habitat for this species includes grassy fields, woodland margins, brushy, cut-over woodlands or dry pine-oak woodlands with loose, friable soils. Suitable habitat for this species was felt to be present on the site, though the gravel/clay soils might limit the presence of this fossorial species. Likely habitats for this species would include the upland mixed woodlands. The fossorial nature of this species makes collection extremely difficult. Survey methods employed were qualitative searches and the use of artificial ground covers.

Pituophis melanoleucus melanoleucus (northern pine snake)—Tennessee 'Threatened'

Habitat for this species includes xeric, pine-oak woodlands with sandy soils, and dry ridge tops. Habitat existing on the site was considered to be "marginal", since the gravel/clay soils might limit the presence of this highly fossorial species. Potential habitats include the mixed woodlands on the ridges and knobs. The fossorial nature of this species makes collection extremely difficult. Survey methods employed were qualitative searches and the use of artificial ground covers.

Aves

Accipiter cooperii *(Cooper's hawk)—Tennessee 'In Need of Management'*

Foraging and nesting habitat for this species includes deciduous woodlands interrupted by clearing or fields, or woodland edges. This adaptable species will also utilize wooded parks, rural woodlots, or suburban habitats. This species strongly prefers deciduous trees as nesting sites. Suitable nesting and foraging habitat for this species was felt to be present on the site. Survey methods employed were direct observation, and a systematic nest search.

Accipiter striatus (Sharp-shinned hawk)—Tennessee 'In Need of Management'

Foraging and nesting habitat for this species includes dense coniferous forests, occasionally mixed or deciduous woodlands, semi-open woodlands and woodland edges. Nest sites are almost always in coniferous trees. Suitable nesting and foraging habitat for this species was felt to be present on the site. Survey methods employed were direct observation, and a systematic nest search.

Aimophila aestivalis (Bachman's sparrow)—Tennessee 'Endangered'

Traditional habitat for this species is open, oak woodlands with herbaceous groundcover, or grassy openings in mature pine woodlands. This species can also be found in old fields, eroded hillsides, clear-cuts replanted with young pines or edge habitats with scattered large pines. This species places its nest on the ground at the base of grass clumps. Habitat existing on the site was considered to be "marginal" at best. The only herbaceous, old field type of habitat present was eliminated during road grading and construction activities. None of the other habitats are present, except possibly the edge habitat with scattered large pines. Survey methods employed were direct observation and species-specific vocalizations.

Ammodramus savannarum (Grasshopper sparrow)—Tennessee 'In Need of Management'

Habitat for this ground-nesting species is open, grassy, or weedy meadows, hayfields or lightly grazed pastures with a minimal intrusion of woody shrubs. The "marginal" habitat for the site was given for the band of herbaceous, weedy vegetation near the access road that was eliminated, following the initial field survey, by road grading and construction in another project. No habitat for this species remained on the site.

Chondestes grammacus (Lark sparrow)—Tennessee 'Threatened'

Habitat for this ground-nesting species is bare, old fields with sparse vegetation and heavily grazed pastures with patches of bare soil and sparse shrub growth. The "marginal" habitat

for the site was given for the band of herbaceous, weedy vegetation near the access road that was eliminated, following the initial field survey, by road grading and construction in another project. No habitat for this species remained on the site.

Circus cyaneus (Northern harrier)—Tennessee 'In Need of Management'

Only wintertime migrants of this species are present in Tennessee. Foraging habitat for this species includes broad, open uplands and brushy lowland fields and idle grasslands. The only suitable foraging habitat for this species on the site was the band of herbaceous, weedy vegetation near the access road that was eliminated, following the initial field survey, by road grading and construction in another project. No suitable foraging habitat for this species remained on the site.

Pooecetes gramineus (Vesper sparrow)—Tennessee 'In Need of Management'

Habitat for this ground-nesting species includes fields, pastures, roadsides or other short grass habitats with scattered shrubs, used as singing perches. The "marginal" habitat for the site was given for the band of herbaceous, weedy vegetation near the access road that was eliminated, following the initial field survey, by road grading and construction in another project. No habitat for this species remained on the site.

Sphyrapicus varius (Yellow-bellied sapsucker)—Tennessee 'In Need of Management'

This late fall, winter, and early spring species utilizes mature deciduous or mixed woodlands with canopy openings, also woodlots and orchards. Suitable foraging habitat for this species existed on the site. Survey methods included direct observation.

Thryomanes bewickii bewickii (Bewick's wren)—Tennessee 'Threatened'

Habitat for this species includes thickets, brush piles, and fence rows in otherwise open or semiopen terrain. This species will also use second growth scrub habitats, brushy forest openings, and forest clearcuts. This species nest in cavities or thick vegetation or brush piles. Habitat existing on the site was considered to be "marginal" at best and included the partially wooded wetland near the access road and possibly some scrub, second growth habitats. Survey methods employed were direct observation, and species-specific vocalizations.

Tyto alba (Common barn owl)—Tennessee 'In Need of Management'

Foraging habitat for this species includes woodland edges and clearings, rural and urban open grasslands, marshes and hayfields. Nesting habitat for this species includes caves, hollow trees, or other manmade or natural cavities. There was no suitable nesting habitat present on the

site. Suitable foraging habitat included the band of herbaceous, weedy vegetation near the access road that was eliminated, following the initial field survey, by road grading and construction in another project. Other suitable forging habitat would be the sparsely wooded, herbaceous wetland, the herbaceous road beds and woodland edge habitats present. Survey methods included direct observation.

Mammalia

Condylura cristata (Star-nosed mole)—Tennessee 'In Need of Mana*gement'*

Suitable habitat for this species includes low, moist woodlands and meadows, marshes or wetland habitats, where the soil is soft and suitable for burrowing and foraging. Suitable habitat on the site was considered "marginal", and would include the herbaceous wetland near the access road, and the wet, herbaceous or wooded depressions in the stream riparian corridors. Survey methods employed were direct observation of burrows or other 'sign', qualitative searches, use of artificial ground covers and construction of drift fence and pitfall arrays.

Corynorhinus rafinesquii (Eastern big-eared bat)—Tennessee 'In Need of Management'

Winter roosting habitat for this colonial species includes caves and abandoned mines. Summer roosting habitat includes hollow trees, abandoned buildings, rock crevices, and areas beneath sloughing tree bark. This species forages along wooded streams or wooded hillsides adjacent to streams. On the site, there was no winter or summer roosting habitat for this species, and the small, probably wet-weather character of the streams on the site rendered foraging habitats both ephemeral and "marginal" in quality.

Myotis leibii (Eastern small-footed bat)—Tennessee 'In Need of Management'

Winter roosting habitat for this colonial species includes caves and abandoned mines. Summer roosting habitat includes abandoned buildings, beneath rocks or in holes in hillsides. This species forages over streams, ponds and along cliffs, ledges or mixed woodlands. On the site, there is no winter roosting habitat, and very "marginal" summer roosting habitat. Foraging habitat over the small streams on the site was both ephemeral and "marginal" in quality, but could exist for this species within the mixed woodlands.

Myotis sodalis (Indiana bat)—Federal and Tennessee 'Endangered'

Winter roosting habitat for this colonial species includes caves and abandoned mines. Summer roosting habitat includes large, hollow trees, and areas beneath sloughing tree bark. This species forages along streams or in the canopy of mature deciduous, riparian woodlands. On the

site, there was neither winter nor summer roosting habitat, nor suitable foraging habitat for this species, due to the absence of caves, large hollow trees and mature woodlands.

Parascalops breweri (Hairy-tailed mole)—Tennessee 'In Need of Management'

Suitable habitat for this species is woodlands, pastures and other well-drained sites with loose, sandy or loamy soils. This species avoids wet depressions, or areas with clay soils. Following the initial field survey, suitable habitat for this species was felt to be present on the site. Subsequently, the lack of sandy or loose, well-drained soils in upland areas, and prevalence of gravel/clay soils would strongly act against the presence of this species. This lack of suitable habitat and the fossorial nature of this species make collection extremely difficult. Survey methods employed were qualitative searches and the use of artificial ground covers.

Sorex longirostris (Southeastern shrew)—Tennessee 'In Need of Management'

This species utilizes a wide variety of habitats, ranging from marshes and wetlands, to upland grass and old field habitats, to dry upland hardwood woodlands and thickets. Virtually all of the site was considered suitable habitat for this species. Survey methods employed were drift fences and pitfall arrays, pitfalls in association with downed or rotting logs, and free-standing pitfalls in low, wet stream riparian habitats.

Synaptomys cooperi (Southern bog lemming)—Tennessee 'In Need of Management'

Suitable habitat for this species includes bogs, marshes, wetlands, mesic grasslands, shrub habitats and woodlands. This species prefers dense growths of herbaceous (sedge, grass, broomsedge) ground cover. This species builds both surface and underground runways. Suitable habitat on the site would include the herbaceous wetland near the access road, and the wet, herbaceous, shrubby or wooded depressions in the stream riparian corridors. Survey methods employed were direct observation of burrows or other 'sign', Sherman live-traps, use of artificial ground covers, and construction of drift fence and pitfall arrays.

Zapus hudsonius (Meadow jumping mouse)—Tennessee 'In Need of Management'

Suitable habitat for this species includes thick vegetation near stream and pond margins, open grassy fields, shrubby woodland clearings or edges, and herbaceous marshes. On the site, some habitat was lost when the band of herbaceous, weedy vegetation near the access road that was eliminated by road grading and construction in another project. Remaining habitat on the site would be the herbaceous wetland near the access road, and the wet, herbaceous or shrubby depressions in the stream riparian corridors. Survey methods employed were Sherman live-traps and construction of drift fence and pitfall arrays.

2.3 CAPTURE AND OBSERVATION METHODS

Direct Observation of Species, or Species-Specific Sign

During field activities conducted on the site, notations were made in field notes and in project databases when sensitive terrestrial animal species in the vertebrate classes of Mammalia, Aves, Reptilia and Amphibia were observed, or when species-specific sign (tracks, vocalizations, fur, feathers, skeletal remains, etc) was identified.

Species Capture Methods

Drift Fence—Pitfall Array: A vertically staked, 3-ft high, fabric silt fence was used to construct a drift fence within the herbaceous/scrub-shrub/young deciduous wetland located immediately north of Melton Branch Road. This fence was placed to extend across the wetland, encompassing portions of herbaceous, emergent vegetation and scrub-shrub/young deciduous sapling habitat within the lentic surface water. A perpendicular wing of drift fence was placed to encompass adjacent, more upland terrestrial habitat. The ground-contact edge of the fence and wing were buried, and posthole diggers were used to install seven pitfall traps (large coffee cans) at intervals along the base on each side of the main fence and wing. During noncollection periods, the arrays were deactivated by covering the cans. This array was targeted to resident amphibian, reptile and small mammal species. Species collected or observed were recorded in field notes, and included in databases.

Natural Barrier Pitfall Arrays: At eight locations in deciduous upland, mixed (deciduous and pine) upland, mixed riparian, and deciduous riparian woodlands, and at one location within a cane-herbaceous wetland, natural barriers (rotting logs in full contact with the ground) were utilized as natural drift fences. At the base on each side of the natural barrier, between two and four 16-oz cups were buried to ground level. At a tenth location, in the cane-herbaceous wetland adjacent to a small stream, six cups were buried at ground level within, or spanning natural runways within the herbaceous ground cover. During noncollection periods, the natural barrier arrays were deactivated providing a means for escape from the cup. These arrays were targeted to resident amphibian, reptile and small mammal species. Species collected or observed were recorded in field notes, and included in databases.

Artificial Ground Covers: Two sheets of 4 ft × 8 ft plywood were cut into eight equal 2 ft × 4 ft sections. Individual sections were placed directly on the ground within deciduous upland, mixed (deciduous and pine) upland, mixed riparian, and deciduous riparian woodland habitats, within the cane-herbaceous wetland, and in the herbaceous/scrub-shrub/young deciduous wetland. The ground covers remained active continuously and were inspected for small mammal, reptilian and/or amphibian species usage at periodic intervals.

Sherman Live Traps: During two 3-day trapping periods, three and five-trap clusters of aluminum, Sherman live traps were set at various locations within deciduous upland, mixed (deciduous and pine) upland, mixed riparian, and deciduous riparian woodlands, and within scrub-shrub, herbaceous, woody slash and cane-herbaceous wetland habitats. These trap clusters were baited using combinations of peanut butter, rolled oats, and cracked corn, and were targeted to small mammal species. Species collected or observed were recorded in field notes, and included in databases. Traps were inspected daily. Captures were identified to genus and released.

Qualitative Survey - Minnow Traps: Two standard metal minnow traps were set within the standing water of the herbaceous/scrub-shrub/young deciduous wetland, located immediately north of the Melton Branch Road. These traps were set during three 3-day intervals, and were inspected daily for amphibian, reptilian and/or small mammal species captures. Captures were identified to genus and released.

Qualitative Survey—Dip-Netting Melton Branch Road Wetland Pool: Multiple dip-net sampling was conducted in the surface water pool to sample for adult and/or larval forms of amphibians and reptiles within the herbaceous/scrub-shrub/young deciduous wetland, located immediately north of the Melton Branch Road. Submerged and emergent, herbaceous vegetation within the wetland pond were dip-netted, including the leaf detrital substrate.

Qualitative Survey—Disturbance of Natural and Artificial Surface Debris: Natural surface debris (rocks, rotting logs, terrestrial and aquatic leaf packs) was disturbed in a variety of available habitats to identify vertebrate species use as refugia. Habitats sampled included the small woodland stream in the culvert location, deciduous and mixed woodlands in riparian and upland areas, and streams associated with the cane/herbaceous wetland. These searches were targeted to resident amphibian, reptile and small mammal species. Species collected or observed were recorded in field notes, and included in databases.

Qualitative Survey—Avian Vocalizations

To coincide with the establishment of nesting territories, six 30- to 45-minute microcassette recordings were made during early summer months to record species-specific vocalizations made by avian species within selected habitats on the site. These recordings targeted two sensitive avian species, *Aimophila aestivalis* (Bachman's sparrow) and *Thryomanes bewickii bewickii* (Bewick's wren), whose presence was considered "marginal" based on site habitat availability.

Qualitative Survey—Avian Nest Search

To coincide with the establishment of nesting territories for two sensitive avian species, a comprehensive search of deciduous and coniferous woodland habitats was conducted during the late spring and early summer months. The avian species targeted by this search were *Accipiter cooperii* (Cooper's hawk) and *Accipiter striatus* (Sharp-shinned hawk).

3. RESULTS

The schedule of field activities, including results of all species survey methods used for surveying sensitive terrestrial animal species, is provided in Table 2. No sensitive animal species were captured or observed.

Table 2. Terrestrial animal species collection/observation results at the TRU Waste Treatment Facility Site in Melton Valley, Oak Ridge, Tennessee

Method	Locale/ Habitate	Date(s) operative	Individual trap-nights	Cumulative trap-nights	Target species	Target species captures, collections, observations	Comments—Non-target species collected or observed
Drift Fence and Pitfall Arrays (7 pitfalls)	Herbaceous wetland at Melton Branch Road	Apr. 20-23, '99 Apr. 23-26,'99 Apr. 27-29,'99 May 10-13,'99	7,7,7,7	21,21, 21,21	Four-toed salamander; Star-nosed mole, Southeastern shrew, Southern bog lemming	none	Decapoda (2)
Qualitative Survey; Minnow Traps (2 traps)	Herbaceous Wetland@Road	Apr. 20-23, '99 Apr. 23-26, '99 Apr.27-29,'99	2,2,2	6,6,6	Four-toed salamander; Star-nosed mole	none	Upland chorus frog (1), Dragonfly nymph
Ground Cover (2 boards)	Herbaceous Wetland@Road	Apr. 23, 26,'99 Apr. 27-29, '99 May 10-13, '99 June 1-2, '99	2,2,6,8,4	2,2,6,8,4	Four-toed salamander; Star-nosed mole	none	Various invertebrates; Decapoda chimneys
Ground Cover (1 board)	Wooded Wet Depression along streambed	Apr. 23,26, '99 Apr. 27-29, '99 May 10-13, '99 June 1-2, '99	1,1,3,4,2	1,1,3,4,2	Four-toed salamander; Star-nosed mole	none	Various invertebrates
Ground Cover (1 board)	Herbaceous road bed	Apr. 23,26, '99 Apr. 27-29, '99 May 10-13, '99	1,1,3,4	1,1,3,4	Eastern slender glass lizard, Southern bog lemming	none	Various invertebrates
Ground Cover (2 boards)	Ridge Top, Mixed Deciduous-Pine Woodland	Apr. 23,26, '99 Apr. 27-29, '99 May 10-13, '99 June 1-2, '99	2,2,6,8,4	2,2,6,8,4	Northern pine snake, Eastern slender glass lizard, Northern & Southern coal skinks, Hairy-tailed mole	none	Various invertebrates
Ground Cover (1 board)	Riparian Deciduous Woodland	Apr. 23,26, '99 Apr. 27-29, '99 May 10-13, '99 June 1-2, '99	1,1,3,4,2	1,1,3,4,2	Eastern slender glass lizard, Hairy-tailed mole, Northern & Southern coal skinks	none	Various invertebrates

Table 2. Terrestrial animal species collection/observation results at the TRU Waste Treatment Facility Site in Melton Valley, Oak Ridge, Tennessee (continued)

Method	Locale/ Habitate	Date(s) operative	Individual trap-nights	Cumulative trap-nights	Target species	Target species captures, collections, observations	Comments—Non-target species collected or observed
Sherman traps #1 (3 trap cluster)	Wooded stream riparian zone	Apr. 26-27, '99	3	3	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none (see comments)	All disturbed by raccoon, reset to woodland tangle
Sherman traps #1 (3 trap cluster)	Woody tangle in low, wet area in deciduous woodland	Apr. 27-29, '99	3	6	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	
Sherman traps #2 (3 trap cluster)	Partial woodland, above road at wet pool	Apr. 26-29,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	
Sherman traps #3 (3 trap cluster)	Herbaceous roadbed	Apr. 26-29,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	*Peromyscus Sp.* (1)
Sherman traps #4 (3 trap cluster)	Deciduous/Pine woodland on ridge top	Apr. 26-29,'99	3	9	Southeastern shrew, Southern bog lemming	none	
Sherman traps #5 (3 trap cluster)	Riparian deciduous/pine flatwoods	Apr. 26-29,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	One trap disturbed by raccoon
Sherman traps #6 (3 trap cluster)	Cane/herbaceous wetland near stream	Apr. 26-29,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	One trap disturbed by raccoon

Table 2. Terrestrial animal species collection/observation results at the TRU Waste Treatment Facility Site in Melton Valley, Oak Ridge, Tennessee (continued)

Method	Locale/ Habitate	Date(s) operative	Individual trap-nights	Cumulative trap-nights	Target species	Target species captures, collections, observations	Comments—Non-target species collected or observed
Sherman traps #1 (5 trap cluster)	Woody debris tangle at low, wet, wooded depression (culvert site)	May 10-14,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	*Peromyscus Sp.* (5); Two trap disturbed by raccoon
Sherman traps #2 (5 trap cluster)	Deciduous woodland on knob below fence cut	May 10-14,'99	3	9	Southeastern shrew, Southern bog lemming	none	*Peromyscus Sp.* (1); Two trap disturbed by raccoon
Sherman traps #3 (5 trap cluster)	Young deciduous woodland downslope of knob	May 10-14,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	
Sherman traps #4 (5 trap cluster)	Herbaceous, shrub, cane wetland	May 10-14,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	
Natural Pitfall Array (4 cups)	Deciduous upland above road	Apr. 26-29,'99 May 10-13,'99	3,3	12,12	Four-toed salamander, Southeastern shrew, Southern bog lemming	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (2 cups)	Deciduous/Pine woodland on ridge top	Apr. 26-29,'99 May 10-13,'99	2,2	6,6	Southeastern shrew, Southern bog lemming	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (4 cups)	Riparian deciduous/pine flatwoods	Apr. 26-29,'99 May 10-13,'99	4,4	12,12	Four-toed salamander, Southeastern shrew, Southern bog lemming, Star-nosed mole	none	One cup dug up by raccoon, replaced; Annelida, Millipedes, Coleoptera

Table 2. Terrestrial animal species collection/observation results at the TRU Waste Treatment Facility Site in Melton Valley, Oak Ridge, Tennessee (continued)

Method	Locale/ Habitate	Date(s) operative	Individual trap-nights	Cumulative trap-nights	Target species	Target species captures, collections, observations	Comments—Non-target species collected or observed
Natural Pitfall Array (3 cups)	Cane/herbaceous wetland near stream	Apr. 26-29,'99 May 10-13,'99	3,3	9,9	Four-toed salamander, Southeastern shrew, Southern bog lemming, Star-nosed mole	none	Annelida, Millipedes, Coleoptera, Decapoda
Natural Pitfall Array (2 cups)	Deciduous woodland in facility site	Apr. 26-29,'99 May 10-13,'99	2,2	6,6	Southeastern shrew, Southern bog lemming	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (3 cups)	Deciduous woodland in facility site	Apr. 26-29,'99 May 10-13,'99	3,3	9,9	Southeastern shrew, Southern bog lemming	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (2 cups)	Deciduous woodland at culvert site	Apr. 26-29,'99 May 10-13,'99	2,2	6,6	Four-toed salamander, Southeastern shrew, Southern bog lemming, Star-nosed mole	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (3 cups)	Along road in young Pine/deciduous woodland	May 10-13,'99	3	9	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (4 cups)	Stream riparian woodland	May 10-13,'99	4	16	Southeastern shrew, Southern bog lemming, Meadow jumping mouse	none	Annelida, Millipedes, Coleoptera
Natural Pitfall Array (6 cups)	Herbaceous, shrub, cane wetland	May 10-13,'99	6	36	Four-toed salamander, Southeastern shrew, Southern bog lemming, Star-nosed mole	none	No natural drift structures; set in runways; Decapoda

Table 2. Terrestrial animal species collection/observation results at the TRU Waste Treatment Facility Site in Melton Valley, Oak Ridge, Tennessee (continued)

Method	Locale/ Habitate	Date(s) operative	Individual trap-nights	Cumulative trap-nights	Target species	Target species captures, collections, observations	Comments—Non-target species collected or observed
Qualitative Searches – Surface Debris, Logs, Rocks	Conducted throughout site by lifting/disturbing surface cover in Aquatic, Riparian and Upland Terrestrial Habitats	June 1-2, 1999	N/A	N/A	Four-toed salamander, Northern & Southern coal skinks, Northern pine snake, Eastern slender glass lizard, Southern bog lemming, Star-nosed mole, Hairy-tailed mole	none	Upland chorus frog, Dusky salamander, Northern slimy salamander, American toad, Brown snake, Smooth earth snake, Worm snake, Five-lined skink, Ground skink,
Qualitative Search – Dip-net Wetland Pool; 30-minute interval	Conducted in wetland pool at Melton Branch Road, 50 dips in lentic water associated with emergent vegetation and leaf detritus	June 1, 1999	N/A	N/A	Four-toed salamander	none	Decapoda, Upland chorus frog tadpoles, Odonata nymphs, 'waterboatmen'
Qualitative Search – Avian Nests	Conducted within all deciduous and pine woodlands, including buffer	June 1-2, 1999	N/A	N/A	Cooper's hawk, Sharp-shinned hawk	none	Whip-poor-will female with 2 nestlings
Avian Vocalizations	Recordings conducted at three locations on successive days in habitat most suitable, each 30-45 min.	June 1-2, 1999	N/A	N/A	Bachman's sparrow, Bewick's wren	none	Mourning dove, Blue jay, Crow, Wood thrush, Red-eyed vireo, Hooded warbler, Northern cardinal, Song sparrow, Carolina wren

4. CONCLUSIONS

A total of 461 capture-nights, accumulated through multiple survey methods (constructed and natural barrier pitfall arrays, ground covers, live-trap clusters, minnow traps) were targeted at sensitive terrestrial animal species potentially present on the site. No sensitive terrestrial animal species were captured or observed during the course of this survey effort.

Timed-interval recordings and thorough qualitative search methods were employed to survey sensitive terrestrial animal species potentially present on the site. No sensitive terrestrial animal species were captured or observed during the course of this survey effort.

Several factors combine to minimize the suitability of the site for use by sensitive terrestrial animal species. First, the acreage within the project site was relatively small. Secondly, there were both limited diversity and quality of habitats suitable for use by sensitive terrestrial animal species. Finally, the habitats present on the project site have undergone land use disturbances, both past and present.

5. REFERENCES

Choate, J. R., J. K. Jones, J. R. Jones, and C. Jones. 1994. Handbook of Mammals of the South-Central States. LSU Press. Baton Rouge, La., and London. 304 pp.

Harvey, M. J. 1992. Bats of the Eastern U.S. Arkansas Game and Fish Commission/USFWS/ TTU. 46 pp.

Mitchell, J. M., E. R. Vail, J. W. Webb, J. W. Evans, A. L. King, and P. A. Hamlett. 1996. Survey of Protected Terrestrial Vertebrates of the Oak Ridge Reservation. Final Report. Lockheed Martin Energy Systems for U.S. Department of Energy. ES/ER/TM-188/R1. 62 pp.

Nicholson, C. P. 1997. Atlas of the Breeding Birds of Tennessee. The University of Tennessee Press. Knoxville, Tenn. 426 pp.

Redmond, W. H. and A. F. Scott. 1996. Atlas of Amphibians in Tennessee. Miscellaneous Publication No. 12. Austin Peay State University. Clarksville, Tenn. 94 pp.

Stokes, D. and L. Stokes. 1996. Field Guide to Birds—Eastern Region. Little, Brown and Company. Boston, New York, Toronto, and London. 471 pp.

Whitaker, J. O., Jr. and W. J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Third edition. Cornell University Press. Comstock Publishing Associates. Ithaca and London. 583 pp.

Wilson, L. A. 1995. Land Manager's Guide to the Amphibians and Reptiles of the South. The Nature Conservancy, SE Region. Chapel Hill, N.C. 324 pp. + Appendices.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C.3

FINDINGS OF SURVEY FOR RARE PLANTS ON THE PROPOSED TRU WASTE FACILITY SITE

THIS PAGE INTENTIONALLY LEFT BLANK

FINDINGS OF THE SURVEY FOR RARE PLANTS ON THE PROPOSED TRANSURANIC WASTE TREATMENT FACILITY SITE IN MELTON VALLEY, OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE

August 25, 1999

prepared for:

Bechtel Jacobs Company LLC
under contract number DE-AC05-98OR22700

prepared by:

Jacobs Environmental Management Team
and
Larry Pounds

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

Approximately five acres have been identified as a lease parcel for a proposed Transuranic (TRU) Waste Treatment Facility (the site) in Melton Valley at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. A rare plant survey of vascular plants on the Oak Ridge Reservation (ORR) was conducted in 1996 but did not focus on the site (ORNL 1996). Complete and accurate identification of all resources on the site is needed to support proper planning, documentation, and management. A survey for rare plants at the site will complete this requirement for plants.

DESCRIPTIVE OVERVIEW OF SITE

The site is at the base of Copper Ridge on the northwest side and includes part of a small side ridge off Copper Ridge, a drainage to the west of the side ridge, a drainage to the east of the side ridge, and an area within an existing fence on the northeast portion of the site. The Nolichucky Shale (Carver and Slater 1994) outcrops in upland areas. Partial clearing along two site boundaries for upgrading the access road and for fence relocation has left part of the site unvegetated; most of the 5-acre site is still vegetated. Trees are generally young and presumably most of the site started succession to the present forest at the creation of ORR in 1942.

The flat area along Melton Valley Access Road has been cleared of vegetation as well as a strip along the future fence location on the south side of the site. Little of the west drainage is within the site boundaries. Most of the west drainage was subject to "beetle cut" several years ago and is now cleared. There is a small, mostly open wetland in this drainage near Melton Valley Access Road. There is some black willow (*Salix nigra*) and young green ash (*Fraxinus pennsyvanica*) in the wetland. See the wetland report on this site for more information on this area.

Virginia pine (*Pinus virginiana*) is dominant in the western slope area. The Virginia pines drop out toward the eastern part of the slope. Some white pines are present in the middle section. As the pines fade out, sugar maple (*Acer saccharum*) and various oaks become more common. The dominant trees in the eastern drainage area are red bud (*Cercis canadensis*), tulip poplar (*Liriodedron tulipifera*), red maple (Acer rubrum) and box elder (*Acer negundo*). Soft rush (*Juncus effusus*} occurs in wetter areas here. An old jeep road is in this drainage area. The exotic species Japanese honeysuckle (Lonicera japonica) and Nepal grass (*Microstegium virmineum*) are common in the drainage. The drainage has been blocked at one point by a dirt road creating a small pool of water. Black willow grows on the edge of the pool and a sedge in the pool. The upper middle slope has an incomplete canopy covering. Rock outcrops at the

surface in this area. Oaks are most common here but there are many tree species including yellow pine. Several small trees or shrubs including blueberries (*Vaccinium arboreum* and *Vaccinium stamineum*), rusty viburnum (*Viburnum rufidulum*), juneberry (*Amelanchier* sp.) and hop hornbeam (*Ostrya virginiana*) also occur here. A small fenced area on the eastern edge of the site contains buildings, paved areas and lawns, but no native vegetation.

2. METHODOLOGY

The project site was surveyed by walking the entire site, a buffer zone of approximately 75 ft, and some adjacent areas with transects 20 ft apart, but varying depending on the visibility of land between the lines walked. This method is described in more detail in *Survey of Protected Vascular Plants on the Oak Ridge Reservation, Oak Ridge, Tennessee* (ORNL 1996). A rare plant survey was conducted (ORNL 1988) over an area that includes part of the site and no listed plants were found. Awl (ORNL 1996) recommended new surveys be performed if the previous survey is more than 5 years old.

Target species for this survey were developed from Sect. 3.4 in ORNL 1996 and current, updated state and federal listings (TDEC 1999). Target species included all state-listed plants reported on ORR and surrounding areas. No federally listed plant species have been reported on ORR or surrounding areas. Table 1 lists target species reported on ORR and Table 2 lists target species known only from surrounding areas. Two state-listed species, Pursh's wild-petunia (*Ruellia purshiana*) and river bulrush (*Scirpus fluviatilis*) have been reported in the Melton Valley area but were not targets in the 1988 survey. These species had not been reported on the ORR or even in the state of Tennessee in 1988. They were added as target species for this survey.

The project site was surveyed for rare plants April 20, 1999. A second visit to the site was made May 12, 1999, to determine if purple fringeless orchid (*Platanthera peramoena)* and/or river bulrush might have been overlooked because of their immaturity during the first visit. No other visits were made because no target species could not have been observed during April and May.

Table 1. Vascular plant species reported on ORR that are listed by state or federal agencies

Species	Common name	Habitat on ORR	Status code
Aureolaria patula	Spreading false-foxglove	River bluff	(C2), T
Carex gravida	Heavy sedge	Dry woods, open areas	S
Carex oxylepis var. pubescense[a]	Hairy sharp-scaled sedge	Shaded wetlands	S
Cimicifuga rubifolia	Appalachian bugbane	River slope	(C2), T
Cypripedium acaule	Pink lady's slipper	Dry to rich woods	E-CE
Delphinum exaltatum	Tall larkspur	Barren, open woods	(C2), E
Diervilla lonicera	Northern bush-honeysuckle	River bluff	T
Draba ramosissima	Branching whitlow-grass	Limestone cliff	S
Elodea nuttallii	Nuttall waterweed	Pond, embayment	S
Fothergilla major	Mountain witch-alder	Woods	T
Hydrastis canadensis	Golden seal	Rich woods	S-CE
Juglans cinerea	Butternut	Slope near stream	(C2),T
Lilium canadense	Canada lily	Moist areas in woods or at woods edge	T
Lilum michiganense[b]	Michigan lily	Moist woods	T
Liparis loeselii	Fen orchid	Forested wetland	E
Panax quinquifolius	Ginseng	Rich woods	S-CE
Platanthera flava var. herbiola	Tuberculed rein-orchid	Forested wetland	T
Plantanthera peramoena	Purple fringeless orchid	Wet meadow	S
Ruellia purshiana	Push's wild-petunia	Dry, open, rocky woods	S
Saxifraga careyana	Carey saxifrage	Moist, shaded rock outcrops	S
Scirpus fluviatilis	River bulrush	Wetland	S
Spiranthes lucida	Shining ladies-tresses	Boggy wetland	T
Thuja occidentalis	Northern white cedar	Rocky river bluffs	S
Viola tripartita var tripartita	Three-parted violet	Rocky, moist woods	S

[a]*Carex oxylepis var. pubescens* has not been relocated during recent surveys.
[b]*Lilium michiganense* is believed to have been extirpated from ORR by the Melton Hill impoundment.

(C2) = special concern for the U.S. Fish and Wildlife Service (listed under the formerly used C2 candidate designation)
E = endangered in Tennessee
T = threatened in Tennessee
S = special concern in Tennessee
CE = status due to commercial exploitation

Table 2. Additional rare plant species reported near ORR that might be present on the site based on available habitat

Species	Common name	Habitat on ORR	Status code*
Agalinis auriculata	Earleaf false-foxglove	Calcareous barren	(C2), E
Berberis canadensis	American barberry	Rocky bluff, creek bank	S
Gnaphalium helleri	Catfoot	Dry woodland edge	S
Liatris cylindracea	Slender blazing star	Calcareous barren	E
Lonicera dioica	Mountain honeysuckle	Rocky river bluff	S
Meehania cordata	Heartleaf meehania	Moist calcareous woods	T
Pedicularis lanceolata	Swamp lousewort	Calcareous wet meadow	T
Solidago ptarmicoides	Prairie goldenrod	Calcareous barren	E
*Pycnanthemum torrei***	Torrey's mountain-mint	Calcareous barren edge	**
*Allium burdickii or A. tricoccom****	Ramps	Moist woods	S-CE

[a]Carl Nordman, state botantist (personal communication) plans to list *P. torrei* with the status S, pending consideration by the scientific advisory committee.
[b]Ramps have been reported near ORR, but there is not sufficient information to determine which of the two species is present or if the occurrence may have been introduced by planting. Both species of ramps have the same state status.

(C2) = special concern for the U.S. Fish and Wildlife Service; listed under the formerly used C2 candidate designation
CE = status due to commercial exploitation
E = endangered in Tennessee
T = threatened in Tennessee
S = special concern in Tennessee

3. RARE PLANT SURVEY RESULTS

The following target species have been reported on ORR and had potential habitats on the site. These species could have been detected on the site during the site visits but they were not found.

1. *Carex gravida*—dry woods or open areas
2. *Cypripedium acaule*—pine or mixed pine hardwood
3. *Juglans cinerea*—deciduous forest
4. *Lilium canadense*—moist, shaded drainages
5. *Platanthera peramoena*—opens wetlands or meadows
6. *Scirpus fluviatilis*—open wetland

Panax quinquefolius may rarely be found in forests as immature as that on the site and could have been detected at the times of the visits, but was not found.

4. CONCLUSIONS

No state or federal listed species are on or adjacent to the site. Therefore, no impacts to listed plant species would be anticipated from implementation of the proposed action.

5. REFERENCES

Carver, M., and M. Slater. 1994. *Architectural/Historical Assessment of the Oak Ridge National Laboratory, Oak Ridge Reservation, Anderson and Roane Counties, Tennessee*

ORNL (Oak Ridge National Laboratory). 1996. Awl, D. J., L. R. Pounds, B. A. Rosensteel, A. L. King, and P. A. Hamlett. *Survey of Protected Vascular Plants on the Oak Ridge Reservation, Oak Ridge, Tennessee*. ES/ER/TM-194.

TDEC (Tennessee Department of Environment and Conservation). 1999. Nordman, Carl. Tennessee Natural Heritage Program Rare Plant List.

APPENDIX C.4

BASELINE NOISE MONITORING IN MELTON VALLEY FOR THE PROPOSED TRU WASTE FACILITY SITE

THIS PAGE INTENTIONALLY LEFT BLANK

DRAFT

BASELINE NOISE MONITORING IN MELTON VALLEY, OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE

September 27, 1999

prepared for:

Bechtel Jacobs Company LLC
under contract number DE-AC05-98OR22700

prepared by:

Jacobs Environmental Management Team
and
S. Brooks

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

FIGURES

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

Baseline Noise Monitoring
In Melton Valley for the
Proposed TRU Waste Facility Site

1. INTRODUCTION

This noise monitoring program was implemented to provide baseline data for evaluation of noise levels that may be caused by construction, operation, and decommissioning of a transuranic (TRU) Waste Treatment Facility in Melton Valley on the Oak Ridge Reservation in Oak Ridge, Tennessee. Two primary anthropogenic noise sources currently exist near the proposed lease site (the site) and are captured by this monitoring program. The two anthropogenic sources are: (1) motor vehicle traffic and (2) industrial activities, equipment, fans, generators, fans, etc. Non-anthropogenic noise sources in Melton Valley include wildlife vocalizations, running water, and noise related to wind. It is anticipated that some increase in the anthropogenic noise sources would take place as a result of the proposed action.

The design of this noise monitoring program was based on the requirements of the Noise Control Act of 1972 [23 *Code of Federal Regulations* (CFR) 722], the Federal-aid Highway Act of 1970 (23 *CFR* 722), and the site topography and currently ongoing site-related activities. The primary considerations in selecting monitoring locations and detection parameters was that comparable data could be collected during and after the proposed action, if needed, and that the data be usable for evaluating current conditions.

2. METHODS

2.1 MONITORING LOCATIONS

Monitoring locations encompassed the proposed lease site and the transportation corridor that will be used by the facility. The locations were representative of: the highway, new access road, site perimeter, and topographic gradients which can influence sound transmission. Two locations were near wetlands to consider sensitive resources if desired. Locations that would be replicable after construction were selected should post-action monitoring ever be desired.

A total of eleven monitoring locations were chosen for this program and are described below and depicted on Figure 1.

1. Centering the new access road where it intersects Highway 95 at the existing fence line.

2. Approximately halfway between Highway 95 and the proposed site, near a triple well assembly, between new road and old road.

3. Approximately 32 feet south of the southwest corner of the proposed site fence line.

4. At peak of proposed site on the south fence line immediately south of the fence post with diagonal supports east and west of it.

5. On the northwest corner of a flat gravel pad immediately east of the emergency generator (#7882), within the Melton Valley Tanks fenced area and above the grade/elevation of the generator and existing fence line.

6. Immediately south of the old Melton Valley Access Rd. near construction map location stake 1.5:1 C-0.26.

7. Immediately west of existing culvert at northwest corner of the proposed site fence line, immediately south of old Melton Valley Access Road.

8. Directly on the southeast corner of the proposed site fence line.

9. Immediately south of old Melton Valley Access Road and west of 781 Access Road, near construction map location stake 21.6.

10. Approximately halfway between locations 3 and 4; south of fence line at post supported with diagonal supports east and west of it.

11. Approximately halfway up the east fence line dividing the proposed site from the existing Melton Valley Tanks area; north and below wetlands B.

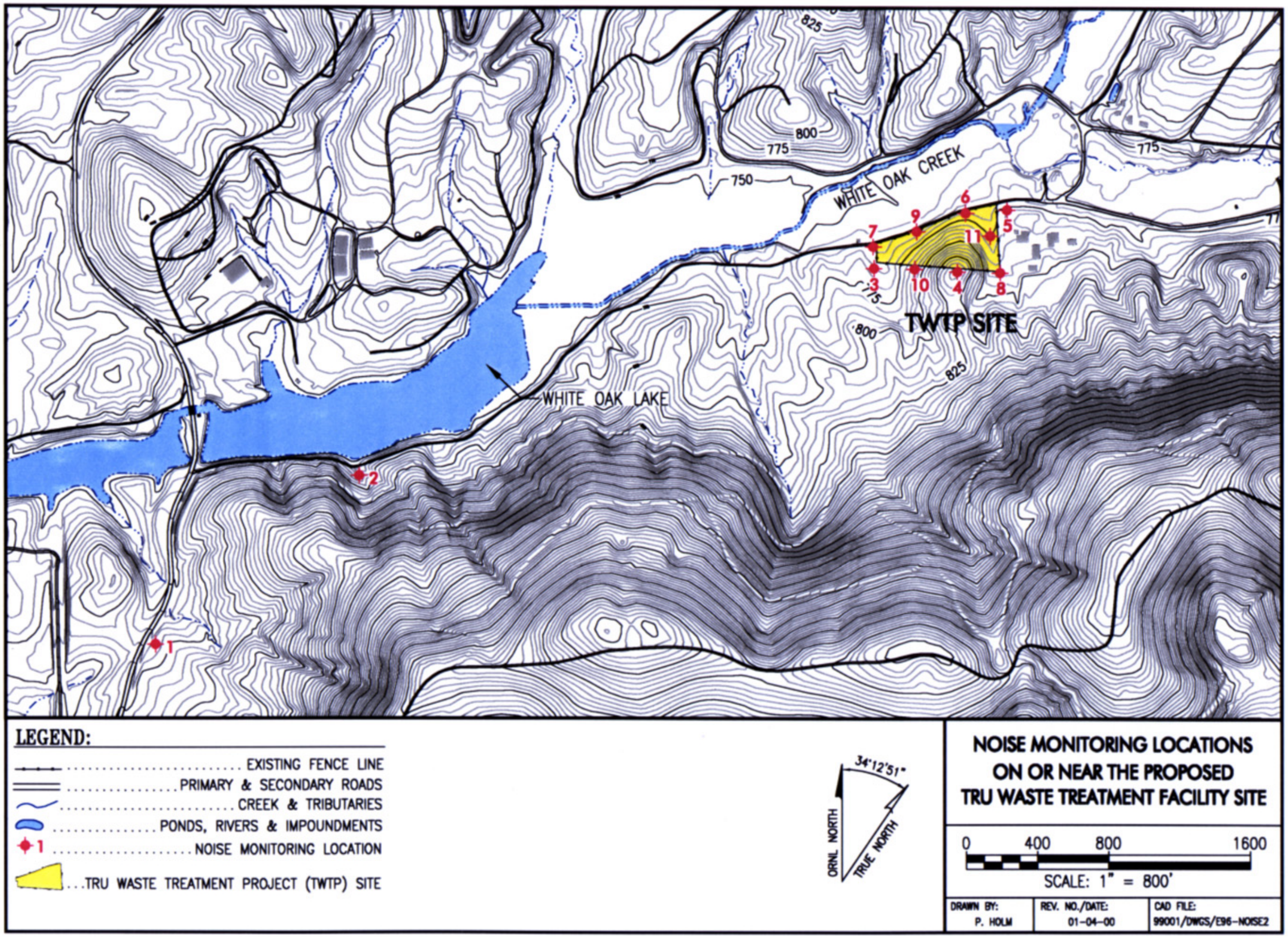


Fig. 1. Noise monitoring locations on or near the proposed TRU Waste Treatment Project site boundary.

2.2 MONITOR SETUP

Monitors were placed 1.5 m aboveground and without impediment such as trees that might brush against them. Tripods were used to standardize microphone height to approximately 1.5 m as much as possible. When appropriate, they were approximately 15 m from the road centerline. This setup was in accordance with U.S. Department of Transportation (DOT) guidelines, should comparison with their criteria ever be desired, and provided consistency for the non-roadway locations.

2.3 INSTRUMENTATION

The instruments used were Metrosonics Inc. db-3080 noise monitors with the standard available microphone and windscreen accessories. This met Federal Highway Administration Program recommendation that monitors be an ANSI S1.4-1983, TYPE II device or better.

Detection limits. The typical operating range for these instruments is between 40 and 140 decibels (dB) with amplitude linearity of ±0.7 dB, and amplitude resolution of 0.1 dB. The lowest sound levels recorded at any time or sample point were over 40 dB so instrument sensitivity was not a problem. Most low noise level times were approximately 45 dB or greater. The monitors are capable of detecting frequencies between 0.125 kHz and 10 kHz. The data logging was weighted for frequencies in the "A" range. Selection of a frequency weighting was intrinsic to use of the monitors, and the "A" range weighting was selected because it is representative of human hearing.

Data logging. Data were collected over a 24-hour (diurnal) period using 5 instruments concurrently during each collection event. This should allow discrimination between differences due to location versus differences due to time (different day). Some monitoring locations were sampled more than once to observe variations in weather, animal, and construction activity. The instruments were set up with a response rate of 16 samples per second, a 3 dB exchange rate, and 1-hour time history intervals. The data logger within each monitor automatically integrated these measurements into noise levels for a chosen time period (e.g., minute, hour, day) with the logarithmic aspect of decibel measurement incorporated into the integration.

Data reporting. For this survey, a Leq on an hourly basis was used to illustrate the diurnal runs at each sample location. Hourly Leqs are the expression used for DOT noise abatement criteria, and were also the most suitable basis for evaluation of diurnal patterns. Raw data files also include the following information: Lav (= Leq at 3 dB exchange rate with this instrument), Lmax, Lpeak, and amplitudes at 0.0, 10.0, 50.0, and 99.9%. A 3dB exchange rate is used in DOT criteria and for Leq calculations. Occupational Safety and Health Act (OSHA) requirements utilize a 5 dB exchange rate so the Leq data should not be applied to OSHA evaluations. The Lav/Leq, Lmax, and Lpeak are available for the 24-hour period as a whole and for each hour during that sampling run.

Field information. Climatic conditions were noted for each sampling event along with any known ambient noise sources or unique events. Temperatures ranged from the low 60s (°F) to the low 90s, humidity varied from 57-100%, winds were calm, and the barometer was at 30 during the monitoring program.

3. RESULTS

Figures 2 through 12 illustrate noise levels at each monitoring location on a diurnal basis. The hourly Leqs and the Lmax Lav for each event are presented in Table 1. Raw data files are provided as Attachment 1.

Data Anomalies. In a few instances, the data logger recorded only 23 Leqs during a 24-hour run. This occurred due to minor variations in the internal clocks of the monitors that resulted in monitor shutdown just before the last hour of data was integrated in the logger. As can be seen in Attachment 1, data from the first diurnal event were reported as Leq on a minute basis necessitating separate manipulation of these data to derive the hourly Leq. Finally, although five monitors were programmed and placed in the field during each monitoring event, battery failure resulted in the failure of three monitors during event "c."

Figure 2. Noise Levels at Location 1, events a and b, in Melton Valley.

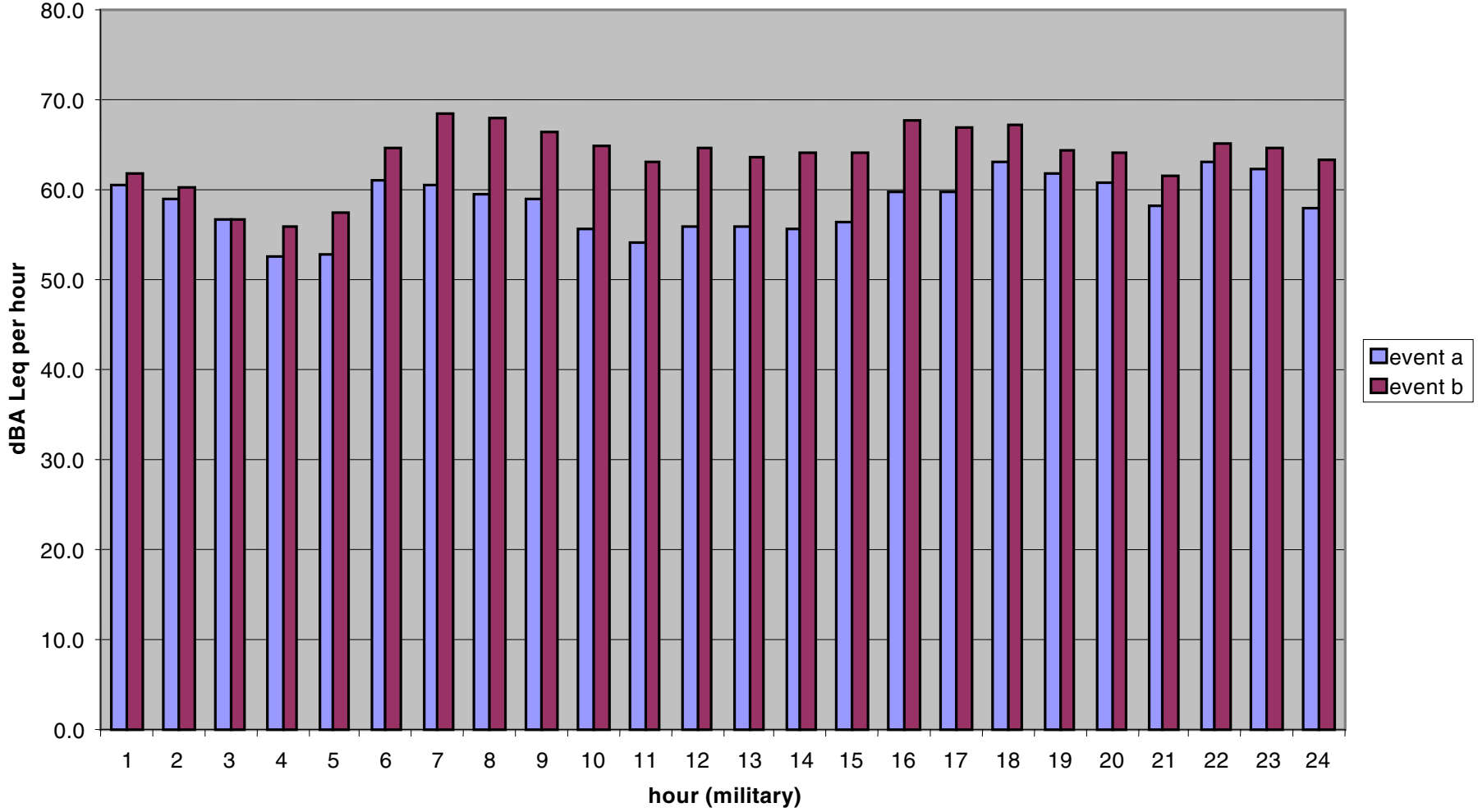


Figure 3. Noise Levels at Location 2, events a, b, and e, in Melton Valley.

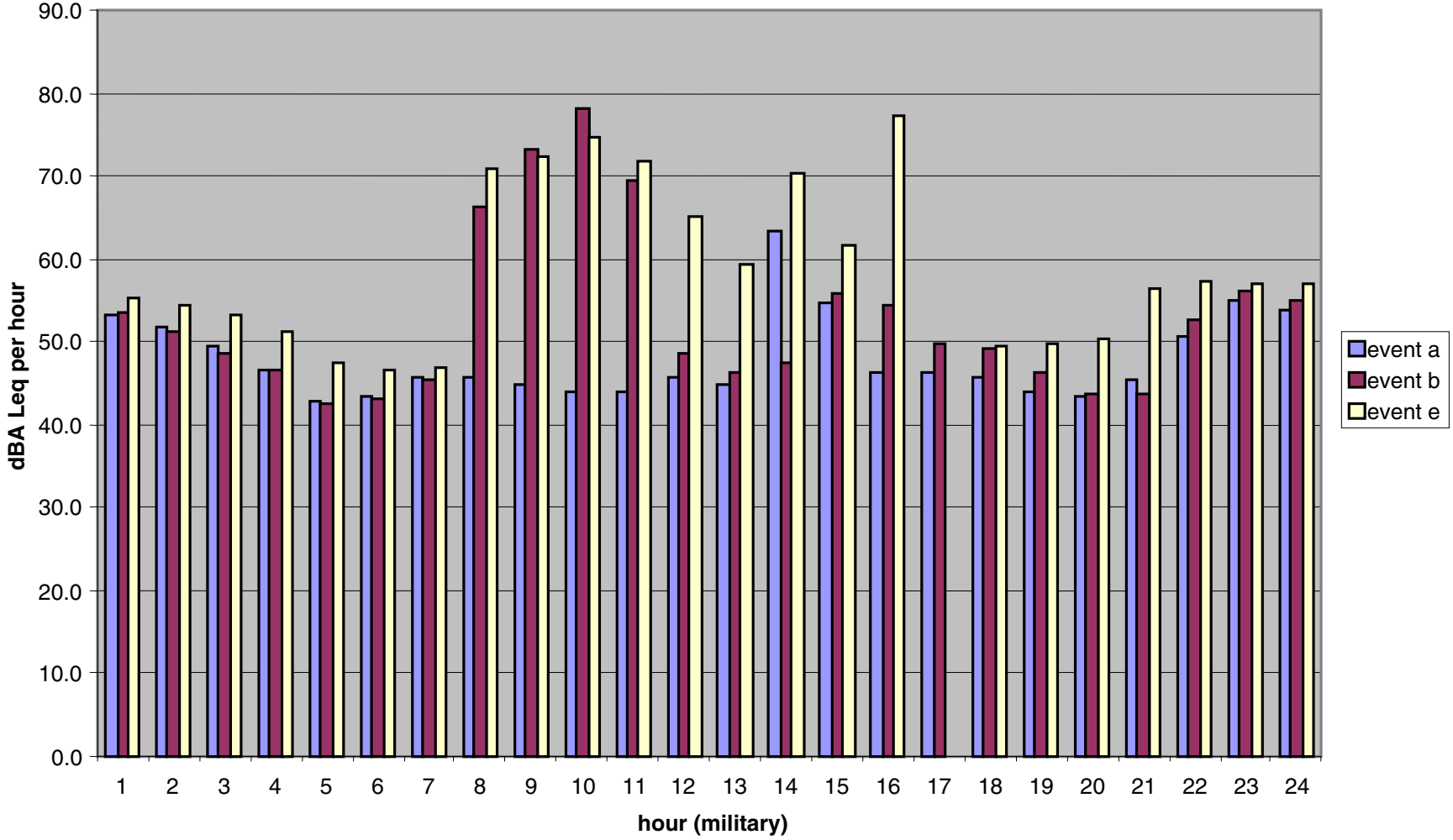


Figure 4. Noise Levels at Location 3, events a, b, and d, in Melton Valley.

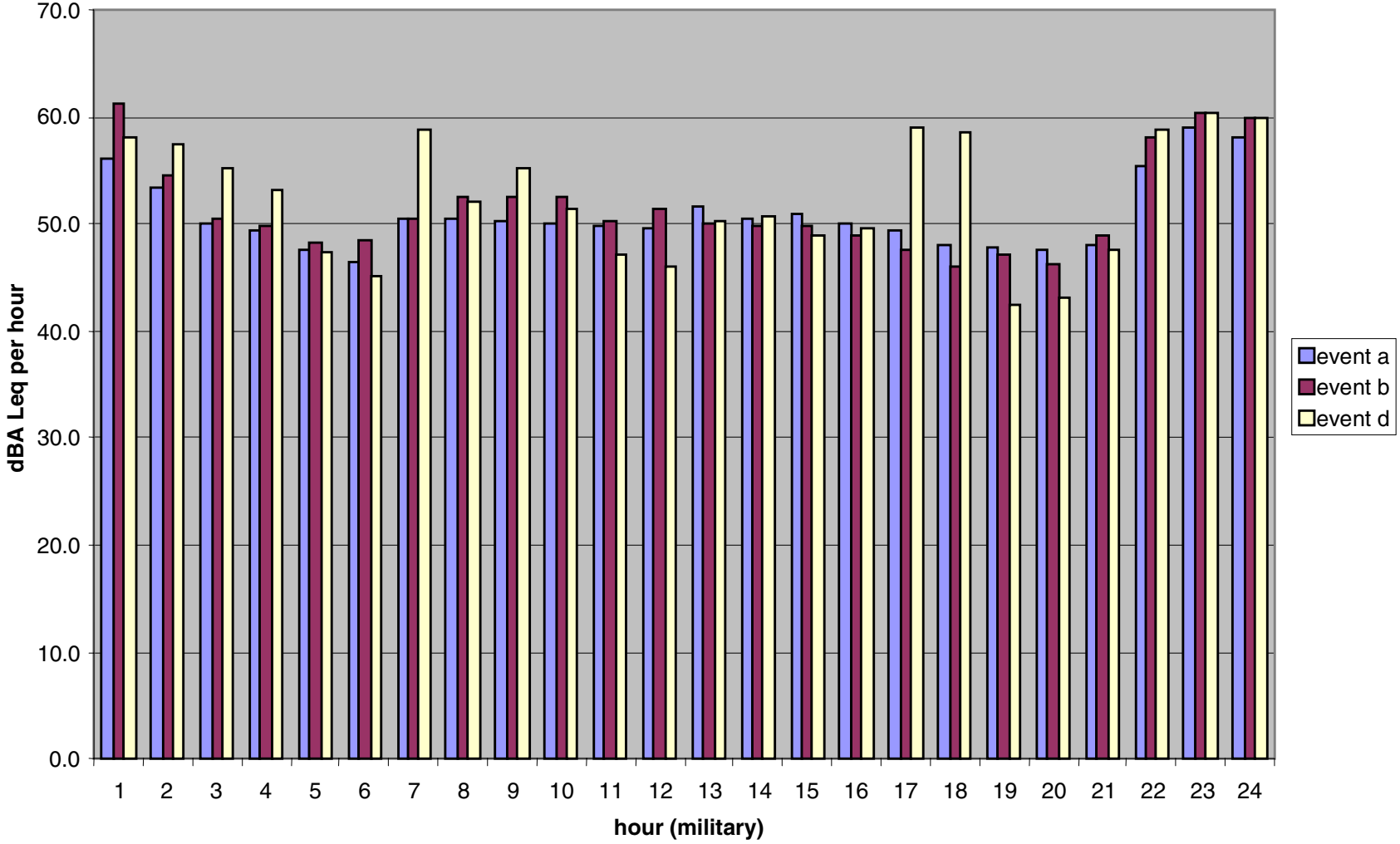


Figure 5. Noise Levels at Location 4, events a, b, and c, in Melton Valley.

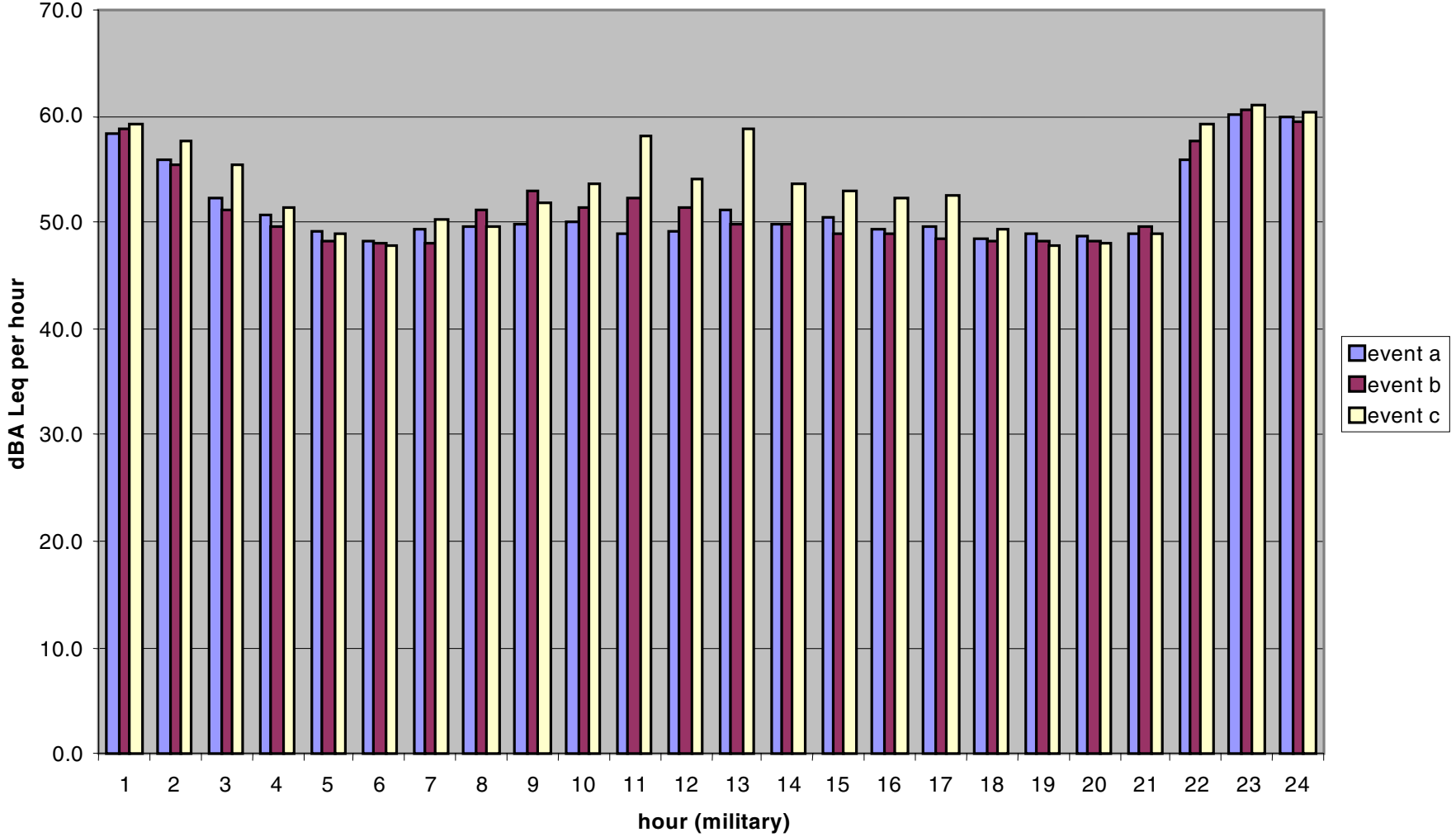


Figure 6. Noise Levels at Location 5, events a and b, in Melton Valley.

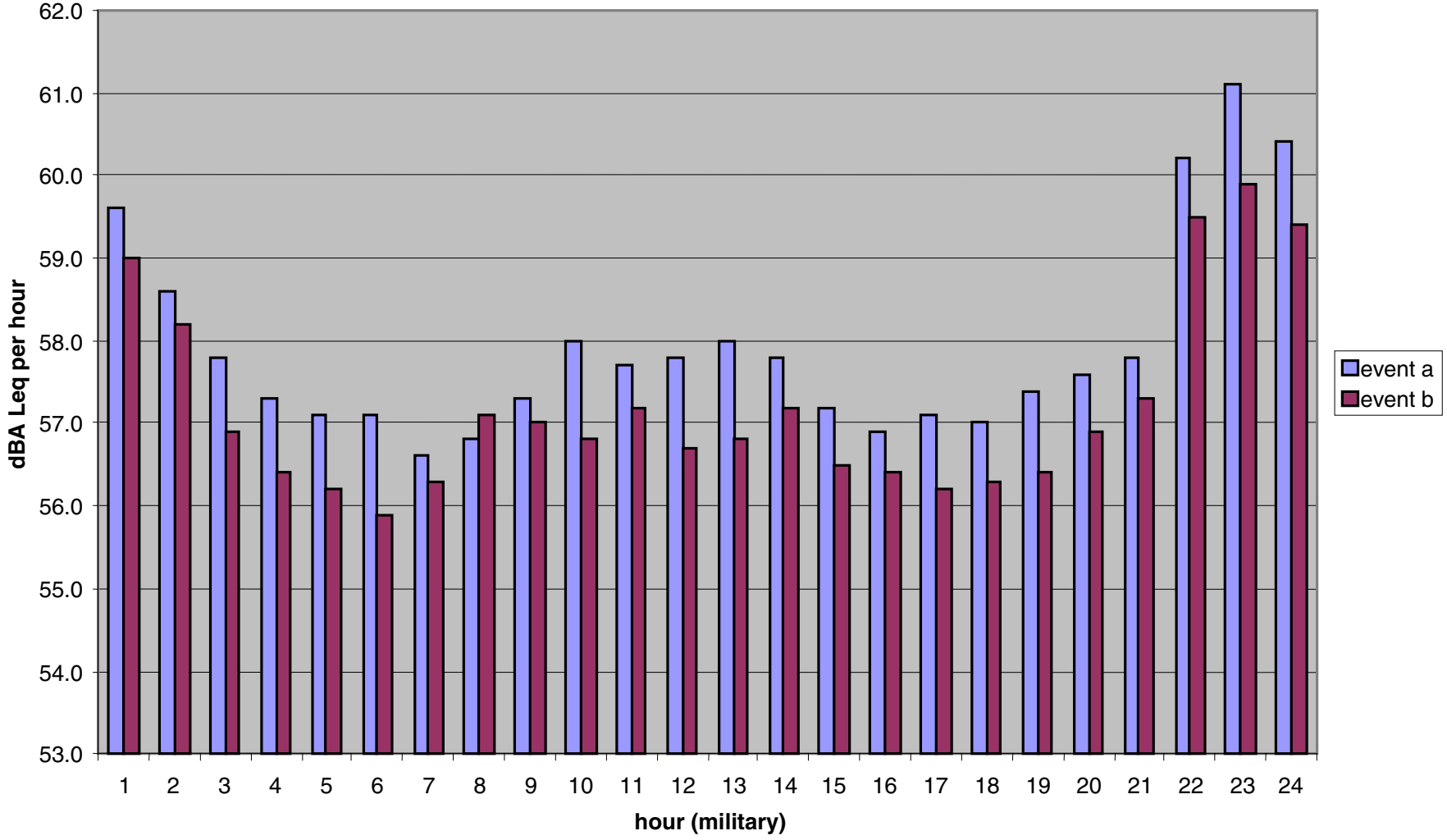


Figure 7. Noise Levels at Location 6, event e, in Melton Valley.

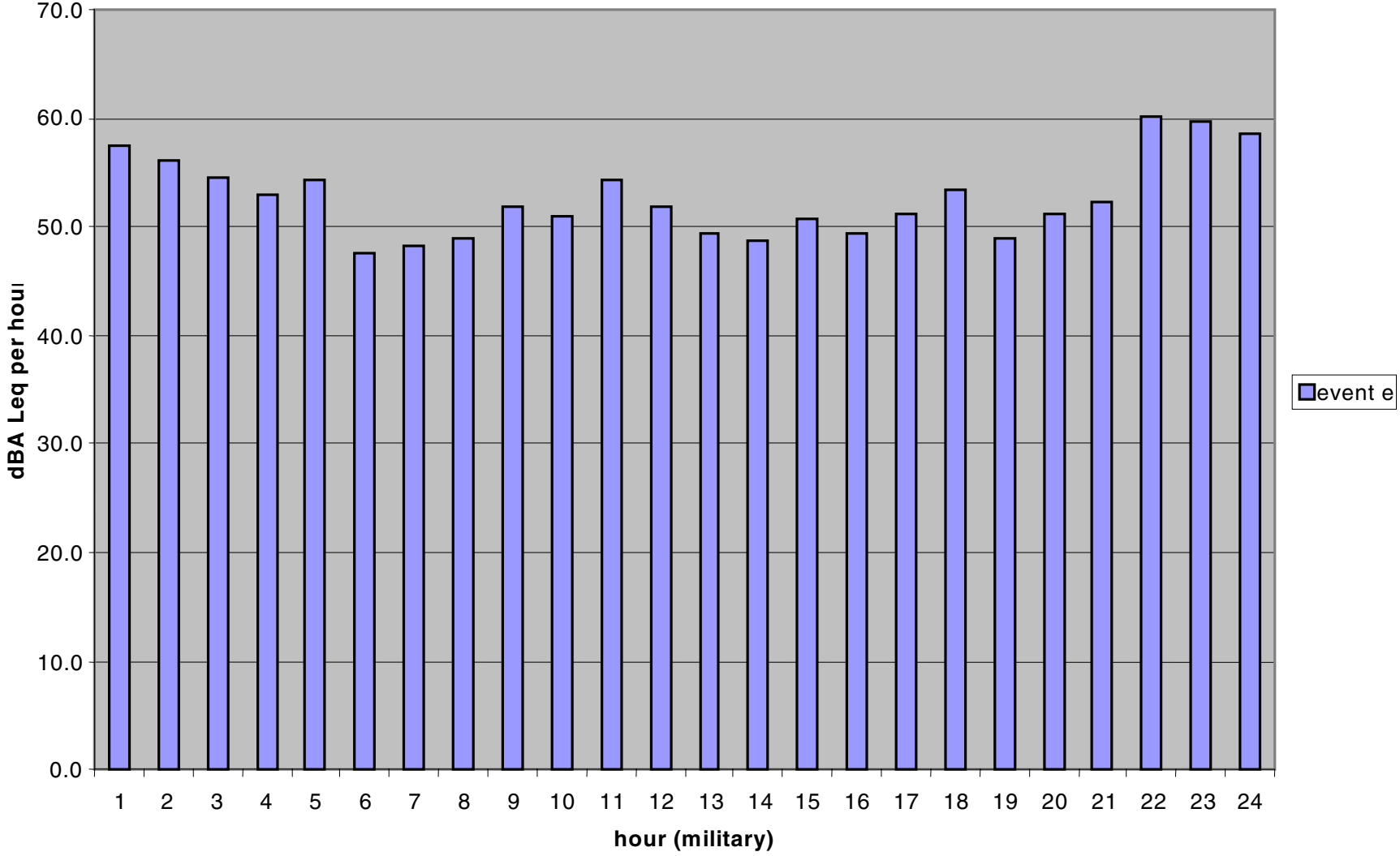


Figure 8. Noise Levels at Location 7, events c and e, in Melton Valley.

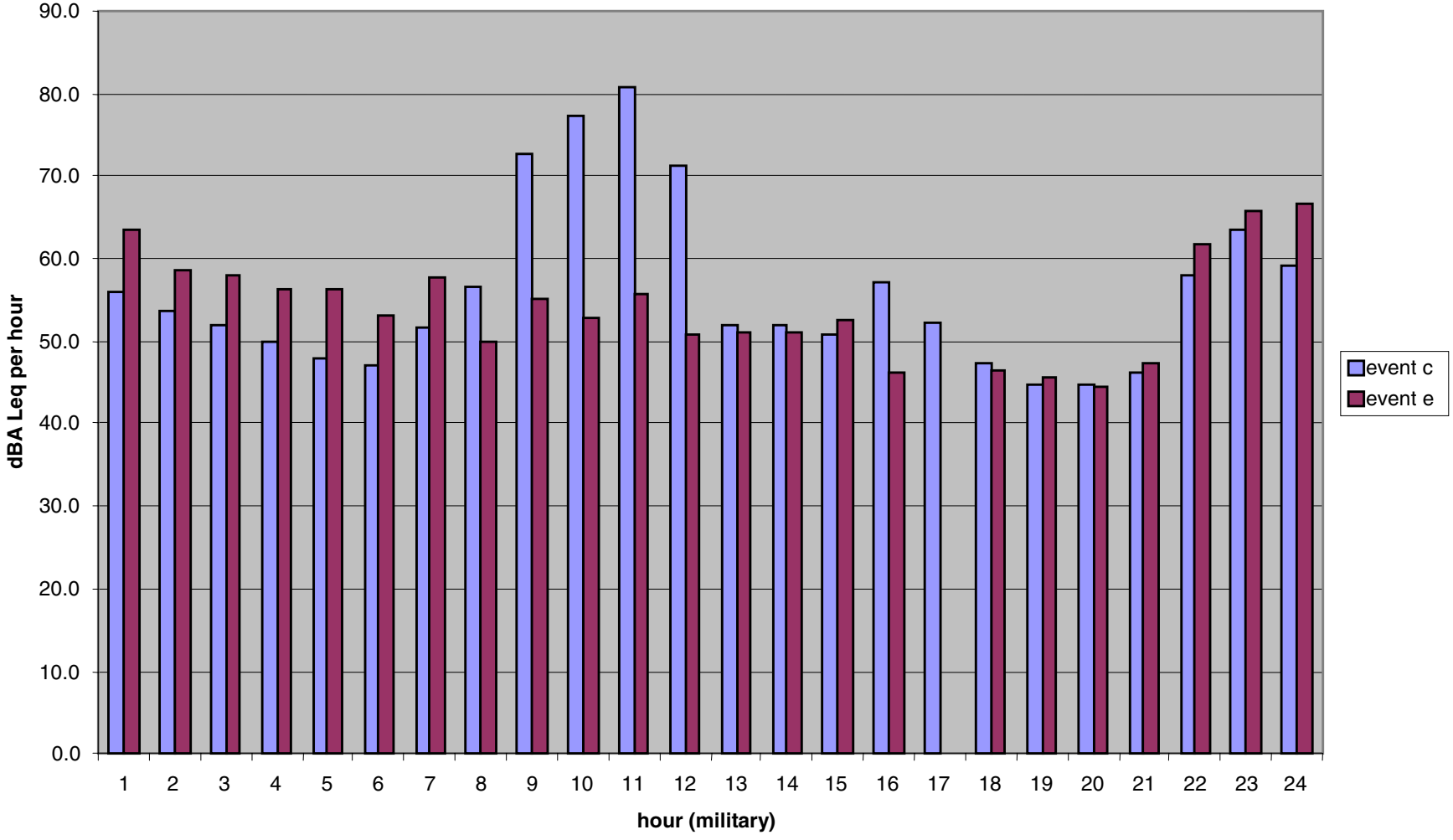


Figure 9. Noise Levels at Location 8, event d, in Melton Valley.

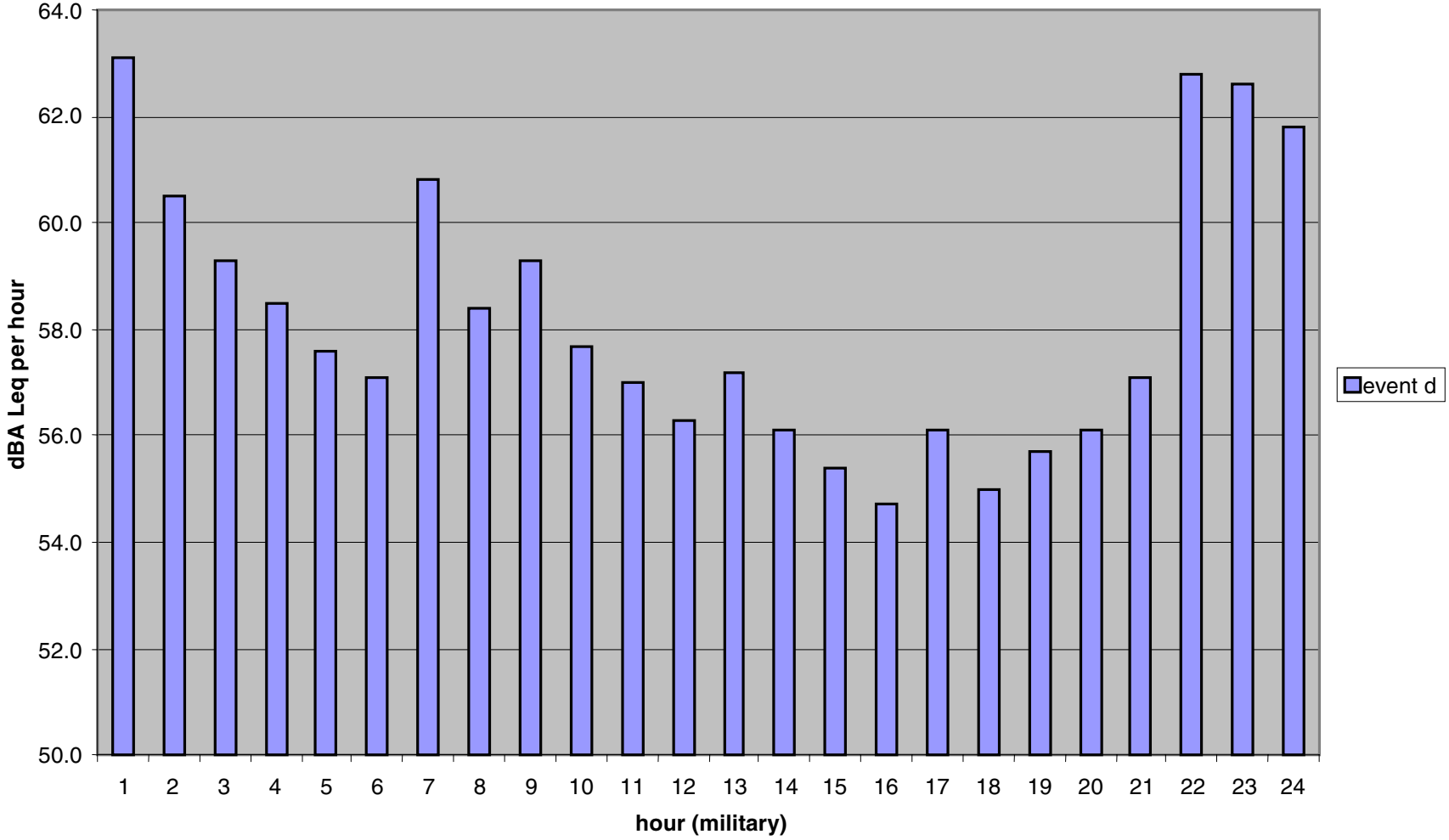


Figure 10. Noise Levels at Location 9, events d and e, in Melton Valley

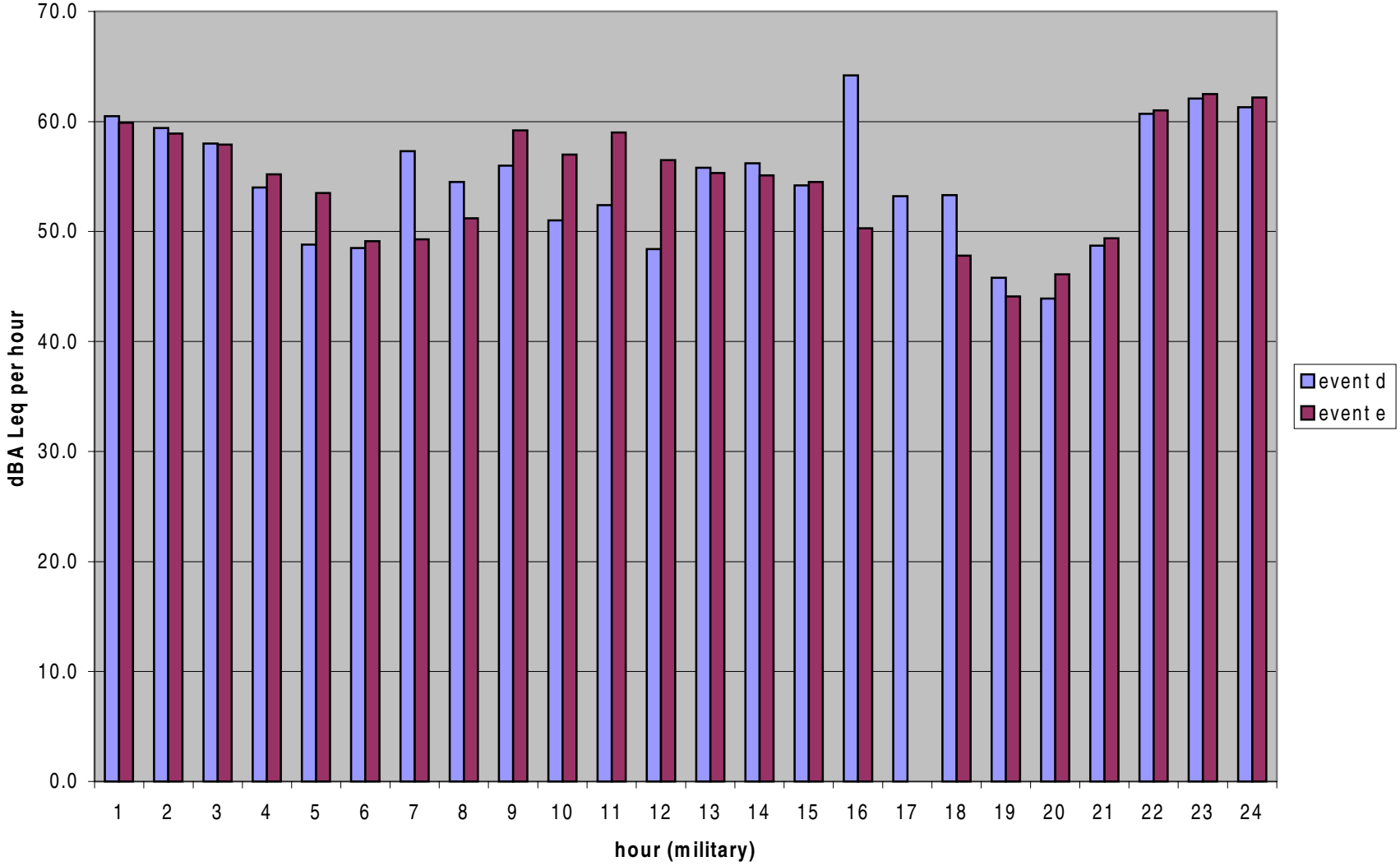


Figure 11. Noise Levels at Location 10, events d and e, in Melton Valley.

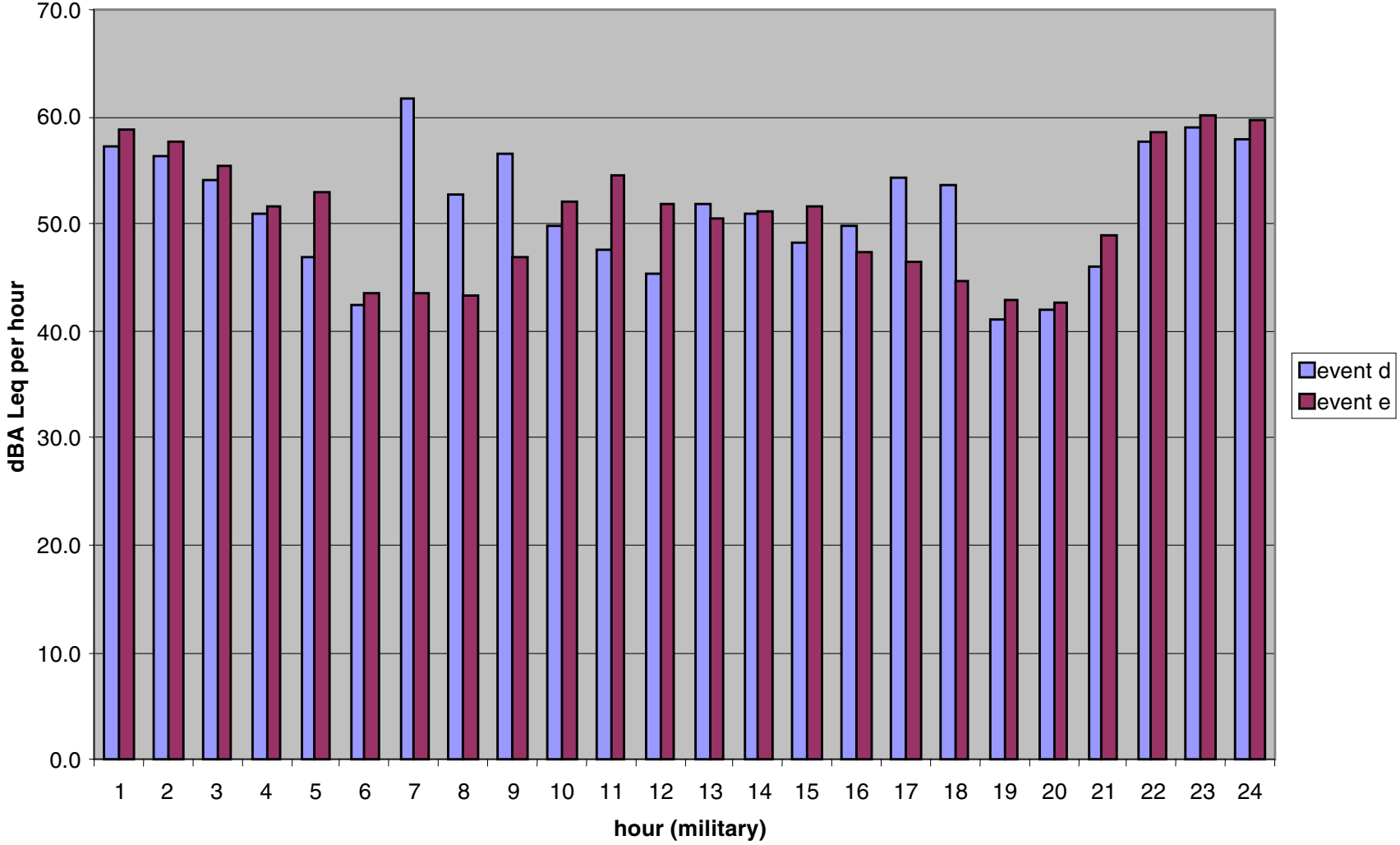


Figure 12. Noise Levels at Location 11, event d, in Melton Valley.

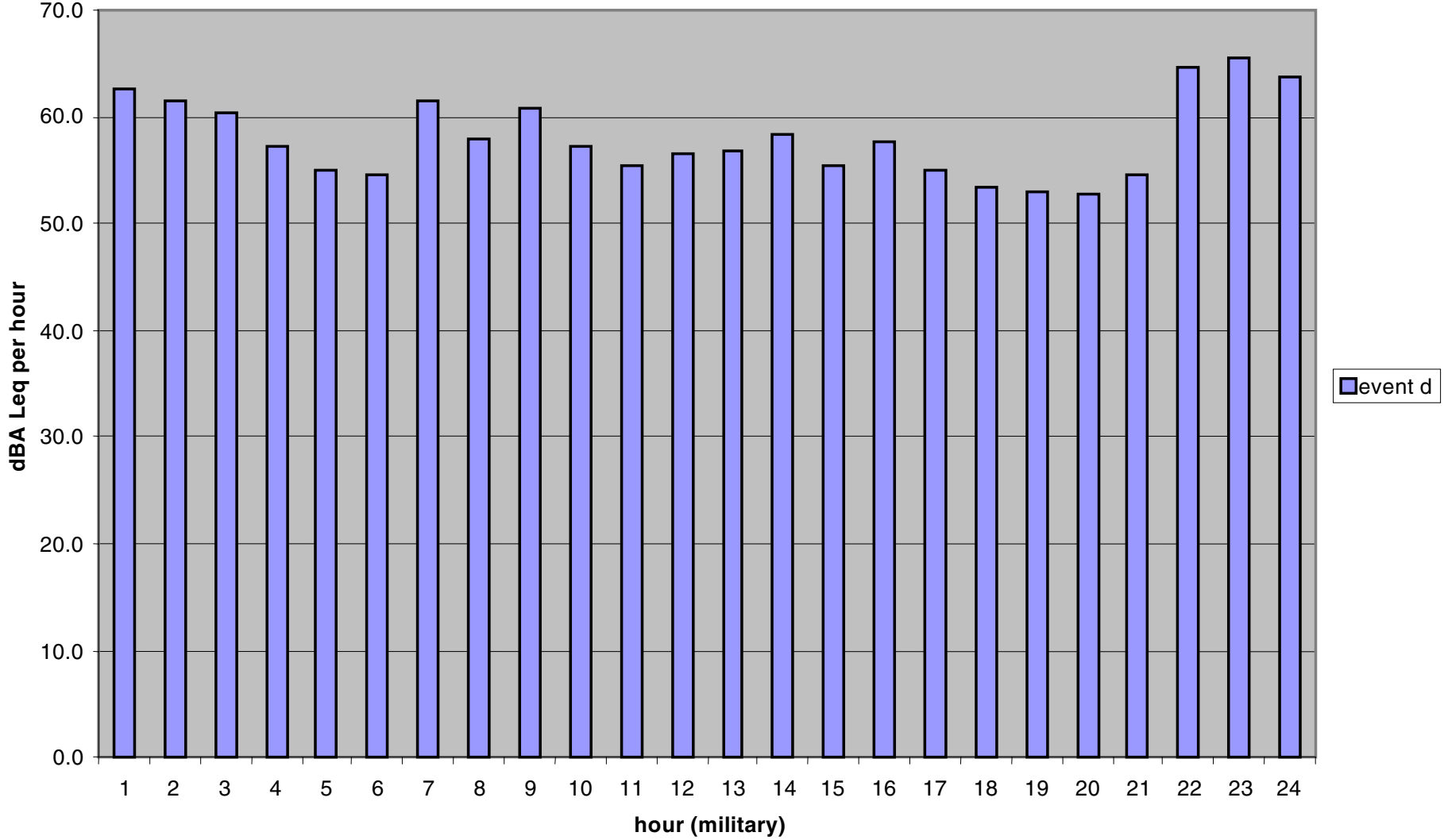


Table 1. Noise monitoring data for Melton Valley proposed TRU waste facility
[noise levels (Leq per hour) in Melton Valley, Oak Ridge, Tennessee]

Location number and sample event		1a	1b	2a	2b	2e	3a	3b	3d	4a	4b	4c	5a	5b	6e	7c	7e	8d	9d	9e	10d	10e	11d
Hour (military)																							
	0	60.5	61.9	53.1	53.5	55.4	56.1	61.2	58.2	58.4	58.7	59.3	59.6	59.0	57.4	55.9	63.6	63.1	60.5	59.9	57.2	58.8	62.6
	1	59.0	60.3	51.7	51.3	54.5	53.3	54.5	57.4	55.8	55.5	57.7	58.6	58.2	56.0	53.8	58.6	60.5	59.4	58.9	56.3	57.6	61.5
	2	56.7	56.6	49.4	48.7	53.3	50.1	50.4	55.1	52.3	51.1	55.3	57.8	56.9	54.5	51.9	57.9	59.3	58.0	57.9	54.1	55.3	60.4
	3	52.7	55.9	46.6	46.6	51.3	49.3	49.9	53.1	50.6	49.5	51.3	57.3	56.4	52.9	49.8	56.2	58.5	54.0	55.2	51.0	51.6	57.1
	4	52.9	57.5	42.9	42.4	47.6	47.6	48.2	47.3	49.1	48.2	48.9	57.1	56.2	54.2	48.0	56.4	57.6	48.8	53.5	46.9	52.9	55.0
	5	60.9	64.6	43.4	43.2	46.6	46.6	48.5	45.1	48.2	47.9	47.8	57.1	55.9	47.5	47.0	53.2	57.1	48.5	49.1	42.5	43.5	54.6
	6	60.6	68.4	45.6	45.3	47.0	50.6	50.5	58.8	49.3	48.1	50.3	56.6	56.3	48.3	51.8	57.6	60.8	57.3	49.3	61.7	43.5	61.4
	7	59.4	67.8	45.8	66.2	71.0	50.4	52.5	52.1	49.6	51.1	49.6	56.8	57.1	49.0	56.7	50.0	58.4	54.5	51.2	52.8	43.4	57.9
	8	58.9	66.3	44.8	73.1	72.5	50.3	52.5	55.1	49.9	53.0	51.8	57.3	57.0	51.8	72.6	55.2	59.3	56.0	59.2	56.5	46.9	60.7
	9	55.6	64.9	43.9	78.2	74.7	50.0	52.4	51.3	50.1	51.4	53.5	58.0	56.8	50.9	77.4	52.7	57.7	51.0	57.0	49.8	52.1	57.3
	10	54.0	63.1	43.8	69.6	71.7	49.8	50.2	47.1	49.0	52.3	58.2	57.7	57.2	54.2	80.7	55.6	57.0	52.4	59.0	47.5	54.5	55.3
	11	55.9	64.7	45.8	48.5	65.0	49.5	51.3	46.1	49.2	51.3	54.0	57.8	56.7	51.9	71.2	50.7	56.3	48.4	56.5	45.3	51.8	56.5
	12	55.8	63.5	44.9	46.4	59.4	51.6	50.1	50.3	51.2	49.9	58.7	58.0	56.8	49.3	51.9	51.1	57.2	55.8	55.3	51.8	50.5	56.8
	13	55.6	64.0	63.5	47.4	70.3	50.4	49.8	50.8	49.7	49.9	53.6	57.8	57.2	48.6	51.9	51.2	56.1	56.2	55.1	51.0	51.1	58.4
	14	56.4	64.0	54.7	55.8	61.7	50.8	49.7	48.9	50.5	49.0	53.0	57.2	56.5	50.7	50.8	52.5	55.4	54.2	54.5	48.2	51.6	55.4
	15	59.7	67.7	46.3	54.5	77.2	49.9	48.9	49.6	49.4	48.8	52.3	56.9	56.4	49.4	57.1	46.3	54.7	64.2	50.3	49.7	47.4	57.7
	16	59.7	67.0	46.4	49.7		49.4	47.6	59.0	49.6	48.5	52.4	57.1	56.2	51.1	52.3		56.1	53.2		54.3	46.4	54.9
	17	63.1	67.1	45.6	49.3	49.4	48.1	46.0	58.6	48.5	48.3	49.4	57.0	56.3	53.4	47.3	46.4	55.0	53.3	47.8	53.7	44.7	53.3
	18	61.7	64.3	44.1	46.2	49.8	47.8	47.1	42.4	48.9	48.3	47.7	57.4	56.4	49.0	44.8	45.6	55.7	45.8	44.1	41.1	42.9	53.0
	19	60.8	64.2	43.3	43.7	50.3	47.7	46.3	43.2	48.7	48.3	47.9	57.6	56.9	51.2	44.7	44.5	56.1	43.9	46.1	42.0	42.6	52.8
	20	58.1	61.5	45.3	43.8	56.5	48.0	49.0	47.5	48.8	49.5	48.9	57.8	57.3	52.2	46.1	47.4	57.1	48.7	49.4	46.1	48.8	54.6
	21	63.0	65.2	50.6	52.7	57.2	55.4	58.1	58.8	55.8	57.7	59.2	60.2	59.5	60.1	57.9	61.8	62.8	60.7	61.0	57.7	58.5	64.6
	22	62.3	64.7	54.9	56.2	57.0	59.1	60.4	60.4	60.1	60.5	61.1	61.1	59.9	59.7	63.5	65.7	62.6	62.1	62.5	58.9	60.2	65.4
	23	57.9	63.4	53.8	55.0	57.0	58.1	59.8	59.9	59.8	59.4	60.4	60.4	59.4	58.6	59.0	66.7	61.8	61.3	62.2	57.9	59.6	63.8
daily Leq		61.1	64.7	61.0	66.4	67.3	52.7	53.6	55.4	53.6	53.7	55.5	58.2	57.4	54.3	69.4	58.7	58.9	57.0	57.1	54.5	54.1	59.7
Lmax		87.6	90.0	87.8	104.4	96.8	70.0	64.8	78.8	72.1	73.2	75.9	74.4	68.0	81.5	90.5	82.7	81.6	93.0	88.8	90.1	81.7	82.5

For locations, see Fig. 3.20 and text descriptions.

Sample Events:
a - 7/13-14/99
b - 7/14-15/99
c - 7/15-16/99
d - 7/19-20/99
e - 7/20-21/99

4. CONCLUSIONS

Although the scope of this survey did not include evaluation or interpretation of the data, a few points are worth noting. Diurnal variations in noise levels were observed during the dawn and dusk periods commonly associated with increased levels of wildlife activity. None of the locations had routine increases in noise levels on a diurnal pattern that could be associated with increased human activity, e.g., work shifts or commuter traffic. Daytime noise levels did increase on days when a construction crew was working on the new Melton Valley Access Road, particularly at Location 2. The highway location (Location 1) had the least variation in noise levels on a diurnal basis, while monitoring locations in vegetated areas had the most noticeable diurnal noise variations. Background noise levels did not fall below 40 dB at any location (the equivalent of a dripping faucet, whispered speech, or a quiet home). Noise levels were often in the 50 to 60 dB range, but did go as high as 98 dB.

5. REFERENCES

Bohrer, P. S., MD. "Effects of Noise Pollution." Sonoma County Medical Association News. May 1997.

Cohen, Y. E. and Knudson, E. I. "Representation of Frequency in the Primary Auditory Field of the Barn Owl Forebrain." The American Physiological Society. APStracts 3:0168N, 1996.

Kowalski, N., Versnel, H., and Shamma, S. "Comparison of Responses in the Anterior and Primary Auditory Fields of the Ferret Cortex." University of Maryland Technical Reports. TR 94-51. 1994.

U.S. Department of Transportation, Federal Highway Administration. Highway Traffic Noise in the United States, Problem and Response.
From **http://www.nonoise.org/library/highway/probresp.htm**.

U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch. Highway Traffic Noise Analysis and Abatement Policy and Guidance. Washington, D.C. June 1995.

ADDITIONAL BACKGROUND NOTES FOR EIS USE (not part of baseline report)

Motor vehicle noise

Noise Control Act of 1972 (23 *CFR* 722) regulates noise levels for:
- Maximum per truck is 80 or 83 dBA depending upon truck type
- Measured 15 m from traffic centerline

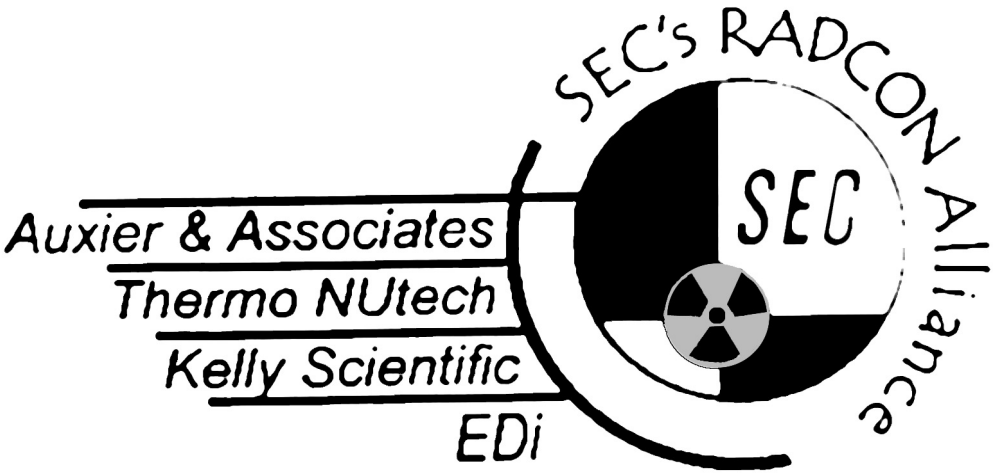
Federal-aid Highway Act of 1970 set noise abatement criteria (NAC) by land use type and human activities (23 *CFR* 722). These are unacceptable levels and are used to determine impact, not a target level for reduction.
- NAC for the outdoors range from 57 dBA to 75 dBA
- NAC for parks (most similar to NRERP) is 67 dB**A**
- NAC for developed areas is 72 dBA

NAC are measured using hourly A-weighted sound levels for "Leq(h)" or "L10"

A noise impact occurs if:
- Projected noise levels approach or exceed NAC, or
- Projected noise levels substantially increase over existing noise levels in the area (a change of 10 dBA for highways)

These regulatory levels and criteria for vehicular traffic were developed on the basis of impacts to humans. Effects on wildlife or vegetation were not considered in them. Also, vibration was not directly considered.

Noise abatement
- Noise mitigation can be provided by noise barriers such as traffic walls, vegetation, buffer zones, insulation in buildings, and management of traffic schedules.



APPENDIX C.5

RADIOLOGICAL SURVEY OF FOSTER WHEELER TRU FACILITY SITE

THIS PAGE INTENTIONALLY LEFT BLANK

C.5. RADIOLOGICAL SURVEY OF FOSTER WHEELER TRU FACILITY SITE

I. A radiological survey was conducted on the Foster Wheeler TRU facility site. Kurt Marcotte (BJC Project Lead Health Physicist for Legacy Waste) requested this survey. The site consisted of approximately 5 acres of land, which borders the existing evacuation road from ORNL's HFIR reactor. Measurements showed the site measured approximately 400 feet on east border; 700 feet on south border; 75 feet on west border; 730 feet on north border.

Parameters given for this survey are:

- 40' grid established, resulting in 123 points on vault.
- Waist high, general area gamma dose rates taken at each point.
- An alpha probe reading taken at each point.
- Beta-Gamma background obtained from average background of site.
- Use of a 10% efficiency for Beta-Gamma dpm conversions.

II. Instruments used for this survey included the following:

- Ludlum Model 2221 frisker with 43-5 probe (Alpha); K30394I
- Ludlum Model 2221 frisker with 44-9 probe (Beta-Gamma); K30237I
- Bicron micro-Rem Dose Rate instrument; K33530I

III. Summary of Results

A total of 123 grid locations were surveyed during this survey along with three monitoring wells on the site. All locations showed no significant increase over background for Beta-Gamma or Alpha. Several areas between grid points were found to have deer droppings, which were above 1000 dpm/100 cm^2. A total of three monitoring wells were identified on the site. Each well was scanned for the presence of radioactive contamination (Alpha/Beta-Gamma) with all readings having no elevated activity. All dose rates on site measured <0.1 mR/h approximately three feet above ground at each survey location.

IV. Conclusion

The data gathered in this survey suggest that there is no gross amount of radioactive surface contamination on the site. All readings taken at each grid location showed no significant increase over the established background. However, Radcon should be notified of any intrusive work that is to be conducted. This survey is in no way a clearance survey of the site.

Radiation / Contamination Survey

Facility: Foster Wheeler TRU Site Room:_____ Date: _____ Time: _____

Instruments Used:

Alpha: K30394I Beta: K30237I

LLD 261.73 DPM/100cm^2 LLD 990 DPM/100cm^2

Lc 48.23 DPM/100cm^2 Lc 496.3 DPM/100cm^2

Dose Rate Inst. K33530I

Smear Counter N/A

Alpha Beta

LLD _____ DPM/100cm^2 LLD _____ DPM/100cm^2

Lc _____ DPM/100cm^2 Lc _____ DPM/100cm^2

RWP#: N/A RCT/Badge#: Reviewed by:

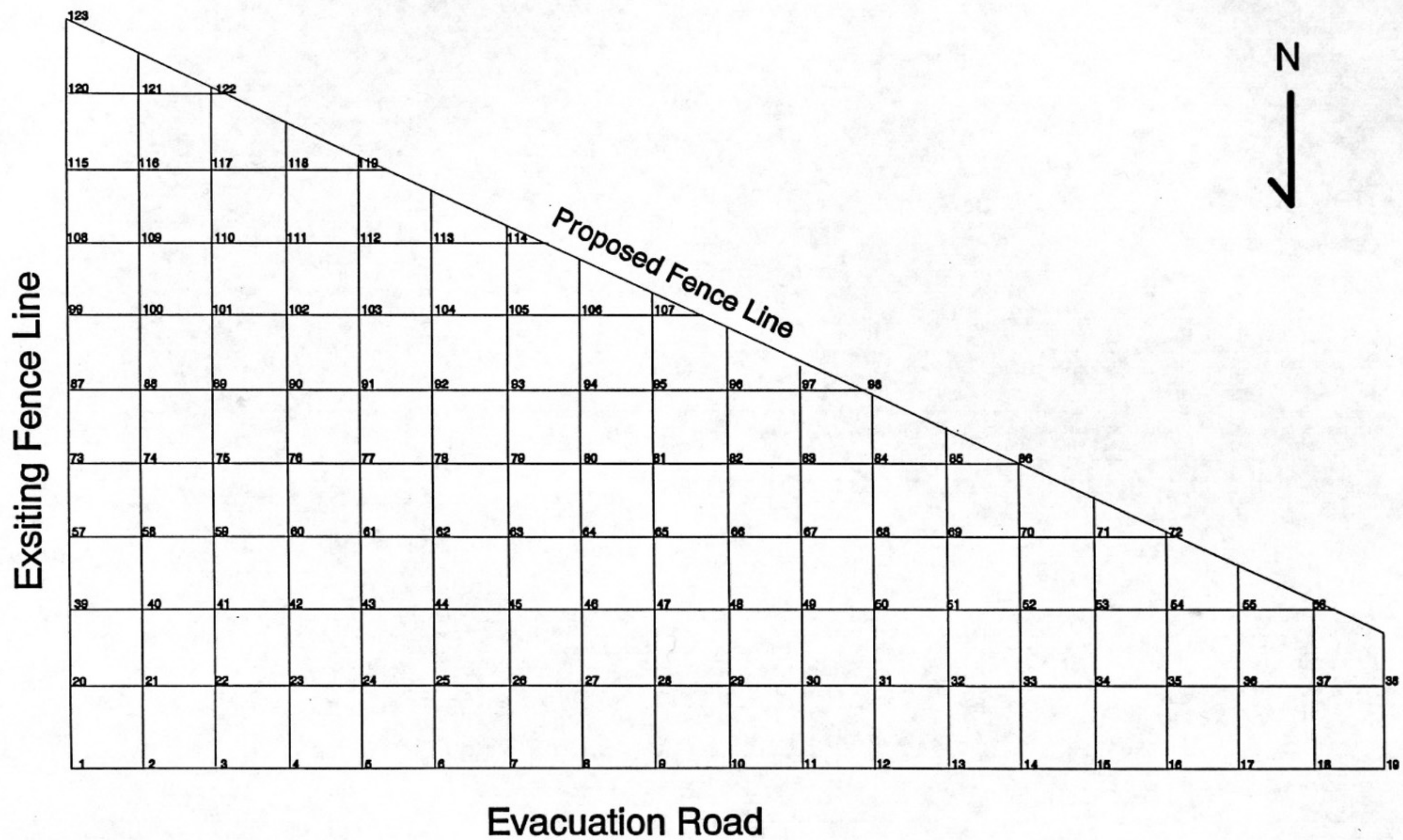
Point No.	Alpha Probe Reading (dpm/100cm2)	Beta-Gamma Probe Reading (dpm/100cm2)	Dose Rate (mR/hr)	Point No.	Alpha Probe Reading (dpm/100cm2)	Beta-Gamma Probe Reading (dpm/100cm2)	Dose Rate (mR/hr)
1	<48.23	<1000	<0.1	31	<48.23	<1000	<0.1
2	<48.23	<1000	<0.1	32	<48.23	<1000	<0.1
3	<48.23	<1000	<0.1	33	<48.23	<1000	<0.1
4	<48.23	<1000	<0.1	34	<48.23	<1000	<0.1
5	<48.23	<1000	<0.1	35	<48.23	<1000	<0.1
6	<48.23	<1000	<0.1	36	<48.23	<1000	<0.1
7	<48.23	<1000	<0.1	37	<48.23	<1000	<0.1
8	<48.23	<1000	<0.1	38	<48.23	<1000	<0.1
9	<48.23	<1000	<0.1	39	<48.23	<1000	<0.1
10	<48.23	<1000	<0.1	40	<48.23	<1000	<0.1
11	<48.23	<1000	<0.1	41	<48.23	<1000	<0.1
12	<48.23	<1000	<0.1	42	<48.23	<1000	<0.1
13	<48.23	<1000	<0.1	43	<48.23	<1000	<0.1
14	<48.23	<1000	<0.1	44	<48.23	<1000	<0.1
15	<48.23	<1000	<0.1	45	<48.23	<1000	<0.1
16	<48.23	<1000	<0.1	46	<48.23	<1000	<0.1
17	<48.23	<1000	<0.1	47	<48.23	<1000	<0.1
18	<48.23	<1000	<0.1	48	<48.23	<1000	<0.1
19	<48.23	<1000	<0.1	49	<48.23	<1000	<0.1
20	<48.23	<1000	<0.1	50	<48.23	<1000	<0.1
21	<48.23	<1000	<0.1	51	<48.23	<1000	<0.1
22	<48.23	<1000	<0.1	52	<48.23	<1000	<0.1
23	<48.23	<1000	<0.1	53	<48.23	<1000	<0.1
24	<48.23	<1000	<0.1	54	<48.23	<1000	<0.1
25	<48.23	<1000	<0.1	55	<48.23	<1000	<0.1
26	<48.23	<1000	<0.1	56	<48.23	<1000	<0.1
27	<48.23	<1000	<0.1	57	<48.23	<1000	<0.1
28	<48.23	<1000	<0.1	58	<48.23	<1000	<0.1
29	<48.23	<1000	<0.1	59	<48.23	<1000	<0.1
30	<48.23	<1000	<0.1	60	<48.23	<1000	<0.1

Radiation / Contamination Survey cont.

Point No.	Alpha Probe Reading (dpm/100cm2)	Beta-Gamma Probe Reading (dpm/100cm2)	Dose Rate (mR/hr)	Point No.	Alpha Probe Reading (dpm/100cm2)	Beta-Gamma Probe Reading (dpm/100cm2)	Dose Rate (mR/hr)
61	<48.23	<1000	<0.1	93	<48.23	<1000	<0.1
62	<48.23	<1000	<0.1	94	<48.23	<1000	<0.1
63	<48.23	<1000	<0.1	95	<48.23	<1000	<0.1
64	<48.23	<1000	<0.1	96	<48.23	<1000	<0.1
65	<48.23	<1000	<0.1	97	<48.23	<1000	<0.1
66	<48.23	<1000	<0.1	98	<48.23	<1000	<0.1
67	<48.23	<1000	<0.1	99	<48.23	<1000	<0.1
68	<48.23	<1000	<0.1	100	<48.23	<1000	<0.1
69	<48.23	<1000	<0.1	101	<48.23	<1000	<0.1
70	<48.23	<1000	<0.1	102	<48.23	<1000	<0.1
71	<48.23	<1000	<0.1	103	<48.23	<1000	<0.1
72	<48.23	<1000	<0.1	104	<48.23	<1000	<0.1
73	<48.23	<1000	<0.1	105	<48.23	<1000	<0.1
74	<48.23	<1000	<0.1	106	<48.23	<1000	<0.1
75	<48.23	<1000	<0.1	107	<48.23	<1000	<0.1
76	<48.23	<1000	<0.1	108	<48.23	<1000	<0.1
77	<48.23	<1000	<0.1	109	<48.23	<1000	<0.1
78	<48.23	<1000	<0.1	110	<48.23	<1000	<0.1
79	<48.23	<1000	<0.1	111	<48.23	<1000	<0.1
80	<48.23	<1000	<0.1	112	<48.23	<1000	<0.1
81	<48.23	<1000	<0.1	113	<48.23	<1000	<0.1
82	<48.23	<1000	<0.1	114	<48.23	<1000	<0.1
83	<48.23	<1000	<0.1	115	<48.23	<1000	<0.1
84	<48.23	<1000	<0.1	116	<48.23	<1000	<0.1
85	<48.23	<1000	<0.1	117	<48.23	<1000	<0.1
86	<48.23	<1000	<0.1	118	<48.23	<1000	<0.1
87	<48.23	<1000	<0.1	119	<48.23	<1000	<0.1
88	<48.23	<1000	<0.1	120	<48.23	<1000	<0.1
89	<48.23	<1000	<0.1	121	<48.23	<1000	<0.1
90	<48.23	<1000	<0.1	122	<48.23	<1000	<0.1
91	<48.23	<1000	<0.1	123	<48.23	<1000	<0.1
92	<48.23	<1000	<0.1	124			

RADIOLOGICAL SURVEY OF FOSTER WHEELER TRU FACILITY SITE

(Numbers represent survey points using 40' grid)



RADIOLOGICAL SURVEY OF FOSTER WHEELER TRU FACILITY SITE Survey Performed by the following technicians			
No.	Print Name	Signature	Badge Number
1	Jacob E May	Jacob E May	616884
2	M Sessions	M Sessions	701258
3	Ricky Nelson	Ricky Nelson	34327
4	MIKE KALMAN	Mike Kalman	33948
5	CHERYL WALKER	Cheryl Walker	625833
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

APPENDIX C.6

WETLANDS ASSESSMENT FOR CONSTRUCTION OF A NEW TRANSURANIC WASTE TREATMENT FACILITY OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

THIS PAGE INTENTIONALLY LEFT BLANK

WETLANDS ASSESSMENT FOR CONSTRUCTION OF A NEW TRANSURANIC WASTE TREATMENT FACILITY OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

Prepared by
Science Applications International Corporation
Engineering and Environmental Management Operation
P.O. Box 2502
Oak Ridge, Tennessee 37831

Prepared for
U.S. Department of Energy
Office of Environmental Management and Enrichment Facilities
Oak Ridge, Tennessee 37831-7101

December 1999

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
OAK RIDGE, TENNESSEE

contributed to the preparation of this document
and should not be considered an eligible contractor for its review.

CONTENTS

FIGURES

ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FR	*Federal Register*
ha	hectare
LDRs	land disposal restrictions
NEPA	National Environmental Policy Act
NRCS	Natural Resource Conservation Service
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
RCRA	Resource Conservation and Recovery Act
SCS	Soil Conservation Service
TDEC	Tennessee Department of Environment and Conservation
TRU	transuranic
USDA	U.S. Department of Agriculture

PREFACE

This Wetlands Assessment has been prepared in accordance with the *Code of Federal Regulations* Title 10, Part 1022, for the purpose of fulfilling the U.S. Department of Energy's responsibilities under Executive Order 11990, Wetlands Protection.

The Executive Order encourages measures to preserve and enhance the natural and beneficial functions of wetlands. This order also requires federal agencies to take action to minimize or mitigate the destruction, loss, and degradation of wetlands. The sequence of mitigation measures should emphasize the importance of:

- avoiding new construction or work in wetlands, unless there is no practicable alternative to that action; and

- minimizing the harm should the only practicable alternative require the proposed action to take place in a wetland.

Finally, the Executive Order seeks to provide early and adequate opportunities for public review of plans and proposals involving new construction or similar projects in wetlands.

The wetlands assessment serves to inform the public of proposed site remediation activities and to present measures or alternatives to the proposed action that will lessen or mitigate adverse effects. This wetlands assessment evaluates actions associated with the construction of a new Transuranic Waste Treatment Facility in Melton Valley at Oak Ridge National Laboratory that would affect wetlands. Information on the following topics is presented: project description, site description, effects on wetlands, alternatives, and mitigation.

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

U.S. Department of Energy (DOE) facilities have performed nuclear energy research and radiochemical production since the early 1940s. The Oak Ridge National Laboratory (ORNL) was constructed during World War II as a pilot-scale plant to support nuclear energy research and the construction of larger plutonium production facilities at Hanford, Washington. ORNL is located on approximately 1174 hectares (ha) (2900 acres), 40 km (25 miles) northwest of the city of Knoxville, in eastern Tennessee (Figure 1-1). The site is located in a water-rich environment that contains numerous small tributaries that flow into the Clinch River located south and west of the site. ORNL is located in the Tennessee Valley between the Great Smoky Mountains (located approximately 80 km or 50 miles east) and the Cumberland Plateau (about 45 km or 25 miles west).

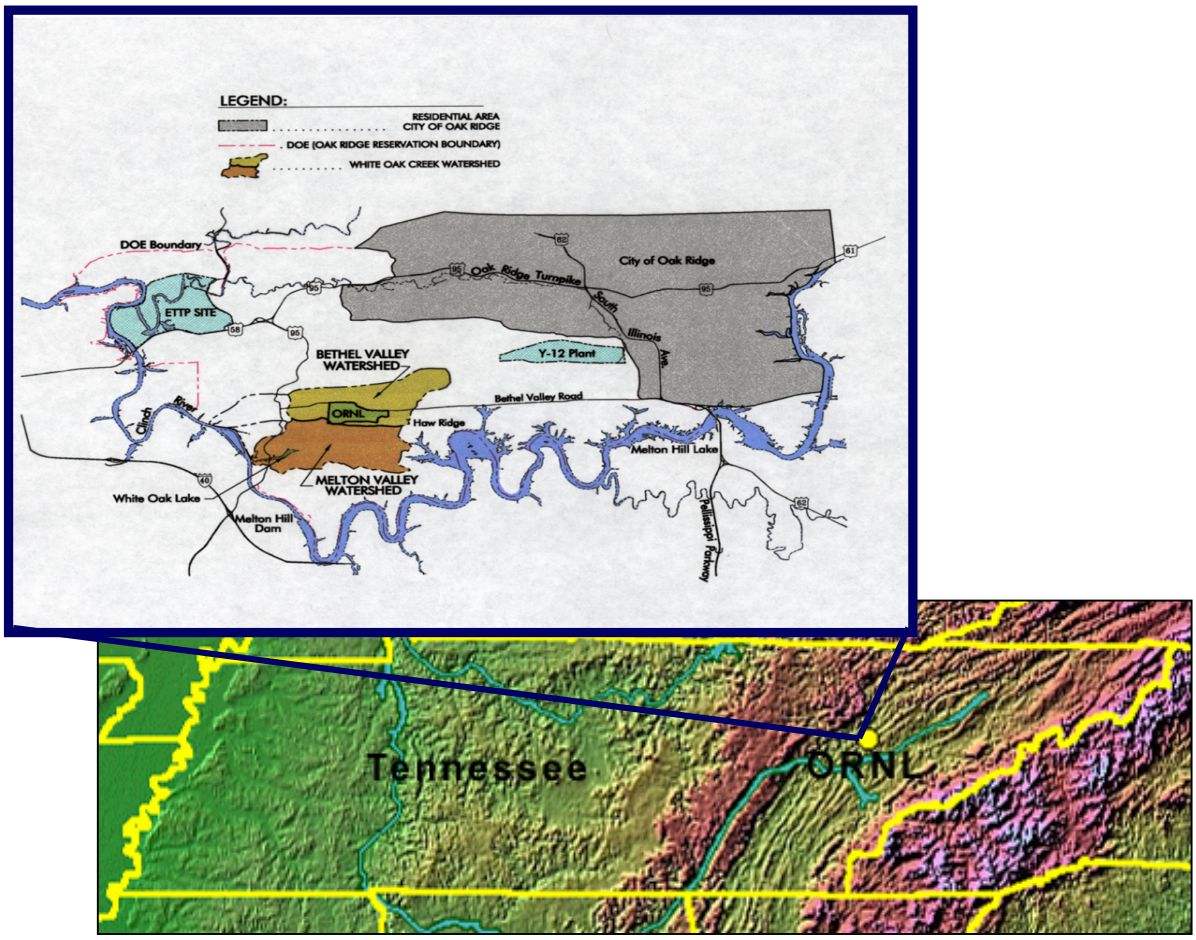


Figure 1-1. Location of Oak Ridge National Laboratory in relation to the city of Oak Ridge, other DOE facilities in the area, and the State of Tennessee.

ORNL continues to be used for DOE operations and is internationally known as a premier research facility. Research and development activities support national defense and energy initiatives. Ongoing waste management and environmental management activities continue to address legacy and newly generated low-level radioactive, transuranic (TRU), and hazardous wastes resulting from research and development activities. These wastes pose environmental concerns, and management of these wastes is a common problem. Risk, cost, and contamination pathway models prove the wastes need to be safely contained and disposed. Meeting the cleanup challenges associated with legacy and newly generated wastes at ORNL is a high priority for the DOE Oak Ridge Operations (ORO), the Tennessee Department of Environment and Conservation (TDEC), and stakeholders. The TRU Waste Treatment Project at ORNL would be an important component of the DOE cleanup efforts at the site.

1.2 BACKGROUND

The waste included in this TRU Waste Treatment Project Environmental Impact Statement (EIS) is classified as three separate types: alpha low-level waste, TRU waste, and low-level waste. Much of the waste displays Resource Conservation and Recovery Act (RCRA) characteristics and, therefore, may be classified as mixed waste. ORNL currently has the largest inventory of remote-handled TRU waste in the DOE complex and a smaller portion of the contact-handled TRU waste. These wastes were generated from the various research and development activities conducted at ORNL.

1.3 WASTE STORAGE AT ORNL

Legacy TRU solid waste is currently stored in subsurface trenches, vaults, and metal buildings. Approximately 30% of the legacy TRU tank wastes are currently stored in aging, underground storage tanks. The remainder of the tank waste is contained in the Melton Valley Storage Tanks. Sampling and analysis has been performed on all of the tank waste. The radiological and chemical properties of the sludge and supernate have been measured, and a bounding analysis was performed on each constituent to provide a range of waste characteristics.

1.4 PURPOSE AND NEED FOR DOE ACTION

DOE is preparing an EIS under the National Environmental Policy Act (NEPA) and its implementing regulations (10 *CFR* 1021) on the proposed construction, operation, and decontamination/decommissioning (D&D) of a TRU Waste Treatment Facility at ORNL in Oak Ridge, Tennessee. The four types of TRU waste that would be treated at the facility are: remote-handled TRU waste sludge; low-level radioactive waste supernate associated with the sludge; contact-handled TRU/alpha low-level radioactive waste solids; and remote-handled TRU/alpha low-level radioactive waste solids. Because much of the radioactive and hazardous waste displays RCRA characteristics, the proposed facility would be permitted under RCRA.

DOE needs to ensure the safe and efficient retrieval, processing, certification, and disposition of legacy TRU waste at ORNL. There are legal mandates that require DOE to address TRU waste management needs. DOE has been directed by the TDEC and the U.S. Environmental Protection Agency (EPA) to address environmental issues including disposal of its legacy TRU waste. DOE is under a Commissioner's Order issued by the State of Tennessee (September 1995) to implement the Site Treatment Plan (under the Federal Facility Compliance Act) that mandates specific requirements for the processing and disposal of ORNL's TRU waste. The primary milestone in the Commissioner's Order is that DOE begin processing TRU sludge in order to make the first shipment to the Waste Isolation Pilot Plant (a DOE transuranic waste disposal facility) in New Mexico by January 2003. In addition, two

Records of Decision [issued in connection with the Federal Facilities Agreement (FFA) among EPA, TDEC, and DOE under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)] require the waste from the Gunite and Associated Tanks Project (DOE 1998) and the Old Hydrofracture Facility Tanks Project to be processed and disposed of along with the TRU waste from the Melton Valley Storage Tanks.

Waste retrieval operations are currently under way to prepare ORNL TRU waste storage tanks for closure. The waste removed from tanks in Bethel Valley at ORNL will be consolidated into the Melton Valley Storage Tanks prior to processing. Following the processing operations, DOE will certify the TRU waste for shipment and disposal at the Waste Isolation Pilot Plant. Low-level radioactive waste resulting from TRU waste processing must be certified by DOE for shipment and disposal at the DOE site(s) selected in a Record of Decision for the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, May 1997 (DOE 1997). Currently, no facilities exist at ORNL, or on the Oak Ridge Reservation (ORR), for processing TRU/alpha low-level radioactive waste.

THIS PAGE INTENTIONALLY LEFT BLANK

2. PROPOSED ACTION AND ALTERNATIVES

DOE will evaluate five alternatives associated with the treatment and disposal of four waste streams at ORNL facilities in Oak Ridge, Tennessee, as part of the EIS. DOE proposes to construct, operate, and decontaminate/decommission a TRU Waste Treatment Facility at ORNL, located in Oak Ridge, Tennessee. The four waste types that would be treated at the proposed facility are remote-handled TRU waste sludge; supernate associated with the sludge; contact-handled TRU/alpha low-level waste solids; and remote-handled TRU/alpha low-level waste solids. Since much of the waste displays RCRA characteristics, the proposed facility would be permitted under RCRA [*Federal Register* (*FR*) 64, Number 17, 1999]. Most of the waste is currently in the Melton Valley area of ORNL in underground waste storage tanks, bunkers, metal buildings, and subsurface trenches.

2.1 SCOPE OF THE PROPOSED ACTION

Under the proposed action, a waste treatment facility would be constructed, operated, and decontaminated/decommissioned under a contract awarded to the Foster Wheeler Environmental Corporation (Foster Wheeler) for the ORNL legacy TRU waste. DOE would lease the Melton Valley Storage Tanks and an adjacent land area totaling approximately 2 ha (5 acres) to Foster Wheeler for construction of the facility (Figure 2-1), subject to notification of the EPA and the State of Tennessee. The Melton Valley Storage Tanks are located in Melton Valley, separated from the main plant area at ORNL by the Haw Ridge. The proposed treatment facility would be fenced, with controlled access to Tennessee State Highway 95 located west of the proposed site.

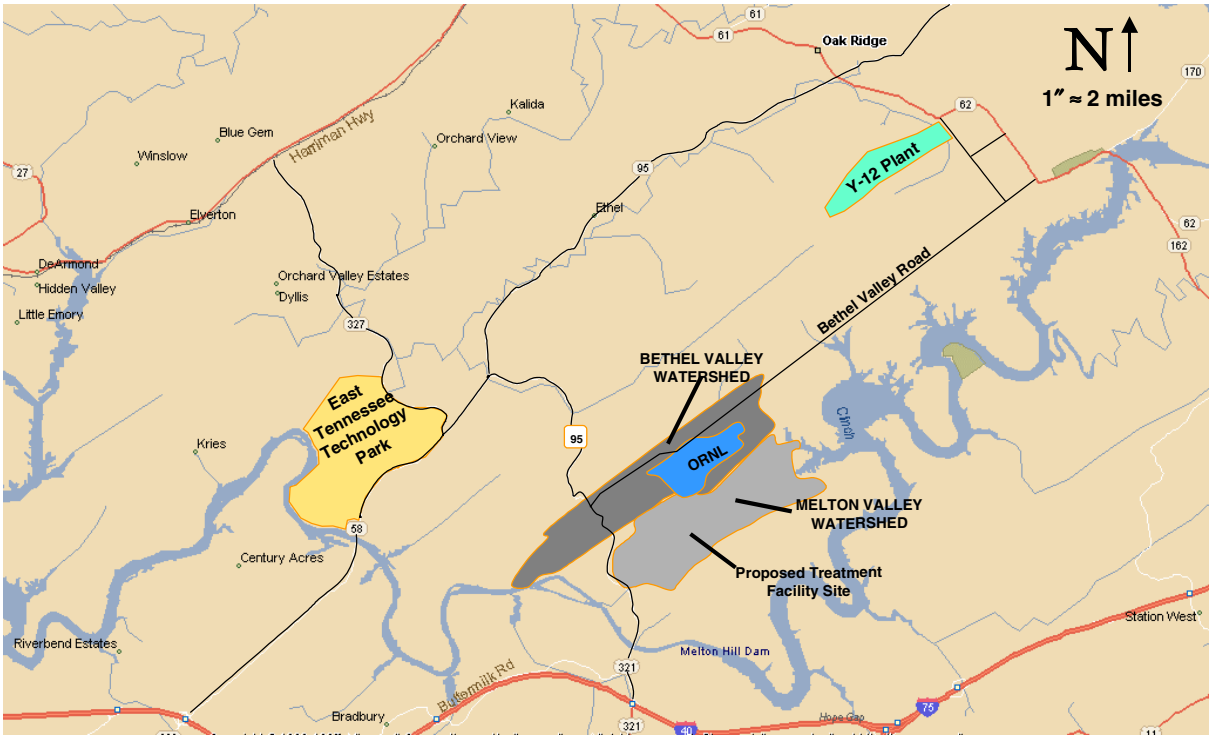


Figure 2-1. General site location on the Oak Ridge Reservation.

The following five alternatives were evaluated in detail:

1. No Action.

2. Low-Temperature Drying for the tank wastes (Melton Valley Storage Tank sludge and supernate) and segregation and compaction for the solid wastes (contact-handled and remote-handled TRU heterogeneous debris). (Proposed Action/Preferred Alternative)

3. Vitrification for the tank wastes (Melton Valley Storage Tank sludge and supernate) and segregation and compaction for the solid wastes (contact-handled and remote-handled TRU heterogeneous debris).

4. Cementation for the tank wastes (Melton Valley Storage Tank sludge and supernate) and segregation and compaction for the solid wastes (contact-handled and remote-handled TRU heterogeneous debris).

5. On-site Treatment and Storage at Oak Ridge Reservation would provide treatment by one of the above action alternatives and continued storage at ORNL following treatment.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, DOE would continue to store TRU waste in tanks, subsurface trenches, vaults, and metal buildings at ORNL. The use of this long-term storage approach is not permissible under RCRA, which does not allow for the storage of untreated hazardous wastes indefinitely.

2.2.1 Facility Description

Initially, no facility would be constructed under the No Action Alternative. However, the generation of additional waste from environmental remediation activities and on-going research and development activities at ORNL would eventually require the installation of more waste storage tanks for the storage of untreated liquid waste, and additional facilities for the storage of remote-handled and contact-handled solids.

2.3 LOW-TEMPERATURE DRYING (PROPOSED ACTION/PREFERRED) ALTERNATIVE

2.3.1 Facility Description

The Low-Temperature Drying (Proposed Action/Preferred) Alternative would involve the construction of a three-and-one-half-story waste treatment and processing facility approximately 37 m (120 ft) west of the Melton Valley Storage Tank area. The proposed facility would be located close to the tank waste in order to avoid transportation of highly radioactive liquid waste across the ORNL site or public roads.

2.3.2 Waste Processing Description

Low-Temperature Drying provides a process of evaporating and drying the sludges and supernates that is flexible enough to cover a wide range of waste properties. The low-temperature drying process would substantially reduce the waste volume, generate minimal amounts of secondary wastes, and meet the waste acceptance criteria of the final disposal facilities. All waste streams would be treated to meet

the waste acceptance criteria of the Waste Isolation Pilot Plant or the Nevada Test Site disposal sites, as well as the RCRA land disposal restrictions (LDRs) in case interim on-site storage of the waste is required.

2.4 VITRIFICATION ALTERNATIVE

The Vitrification Alternative has similar objectives, scheduling constraints, and facility constraints as the Low-Temperature Drying Alternative.

2.4.1 Facility Description

The facility for the Vitrification Alternative would be located on 2 to 2.8 ha (5 to 7 acres) in the same vicinity as the facility for the Low-Temperature Drying Alternative. The overall design and infrastructure of the Vitrification facility would generally be similar to the Low-Temperature Drying facility, with a three-and-one-half-story structure.

2.4.2 Waste Processing Description

The Vitrification Alternative waste processing consists of sorting, compaction, grouting, and vitrification to treat the waste. The vitrification system would be expected to treat liquids, soils, sludges, and other material of a size less than the RCRA definition of debris.

2.5 CEMENTATION ALTERNATIVE

This alternative presents a processing approach that features sludge/supernate separation by hydrocyclone/centrifuge pre-treatment, and subsequent cementation for the tank wastes, and segregation and supercompaction for the contact-handled and remote-handled wastes.

2.5.1 Facility Description

The facility for the Cementation Alternative would be located within an approximate 2-ha (5-acre) plot of land located in the same vicinity as the facility for the Low-Temperature Drying Alternative, with the justification for the location based on the same factors. The overall design and infrastructure of this Cementation facility would generally be similar to the Low-Temperature Drying facility.

2.5.2 Waste Treatment Description

The cementation technology is based on proven process operations conducted at DOE's Hanford faclity near Richland, Washington, and information provided in a feasiblity study. The Cementation Alternative would divert storm water around the facility, and gate valves would be installed in the diversion basins, in the event of a spill, as pollution prevention measures. The off-gas system would minimize air emisions, and liquid used for the decontamination of the cementation treatment system would be transferred back into the cementation treatment system as waste minimization measures.

2.6 TREATMENT AND WASTE STORAGE AT ORNL ALTERNATIVE

This alternative would entail waste processing by any of the three previous action alternatives and indefinite waste storage at ORNL rather than shipment to the Waste Isolation Pilot Plant or the Nevada Test Site. The residual wastes are remote-handled wastes, and their associated doses would remain

sufficiently elevated that remote handling would be necessary during storage onsite at ORNL. After processing, the remote-handled TRU and remote-handled low-level waste residuals would be stored onsite in a new storage facility designed to handle the treated remote-handled waste.

3. SITE DESCRIPTION

3.1 PROPOSED TRU WASTE TREATMENT FACILITY SITE

The proposed TRU Waste Treatment Facility would be located on a 2- to 2.8-ha (5- to 7-acre) site adjacent to the Melton Valley Storage Tanks.

3.1.1 Wetlands

There are six wetlands within 0.8 km (0.5 mile) of the proposed TRU waste treatment facility site, herein labeled as Wetlands A, B, C, D, E, and F (Figure 3-1). The wetlands were identified using three sources of information, including: (1) a report on wetland delineation on the proposed TRU waste treatment facility site (Jacobs and Rosensteel 1999); (2) an on-site reconnaissance by wetland scientists from SAIC on June 2, 1999; and (3) review of National Wetland Inventory maps. The six wetlands are briefly described below.

Jacobs and Rosensteel (1999) identified and delineated four small wetlands (Wetlands A, B, C, and D) on or adjacent to the TRU Waste Treatment Facility site (Figure 3-1). A copy of the report, which contains detailed descriptions of the wetlands along with copies of the field data sheets, is presented in Appendix C and, thus, will only be summarized here. Wetlands A, B, and C were delineated during the author's field survey of the TRU Waste Treatment Facility site on April 20, 1999. Wetland D was initially identified in April 1992 by B. Rosensteel and was not delineated again.

Wetland A is approximately 0.146 ha (0.36 acre) and is located approximately 91 m (298 ft) south of the southwest corner of the TRU Waste Treatment Facility site (Figure 3-1). It is a saturated, temporarily flooded, palustrine emergent wetland in an intermittent stream drainage. The stream originates upslope near the base of Copper Ridge and flows through a clearing where the wetland has developed around seeps that contribute to the stream flow.

Wetland B is only 0.012 ha (0.03 acre) and is located in an intermittent stream along the eastern side of the proposed site (Figure 3-1). According to Jacobs and Rosensteel (1999), this wetland is temporarily flooded and saturated and is palustrine scrub-shrub. An old road-crossing culvert located downstream from the site acts to slow and retain stream flow, thereby causing the riparian zone saturation at the wetland.

Wetland C is 0.036 ha (0.09 acre) and is located approximately 91 m (298 ft) south of the TRU Waste Treatment Facility's southeast corner (Figure 3-1). Jacobs and Rosensteel (1999) classified the wetland as saturated, palustrine emergent, located in a disturbed, grassy area upslope. Wetland C is periodically mowed, so the wetland is in a topographic low area that might have contained a section of intermittent stream prior to land disturbance and hydrological alterations. Water discharges from seeps in the wetland and then re-enters the ground at the downslope end of the wetland.

Wetland D is 0.016 ha (0.04 acre) and is located in the northwest corner of the proposed TRU Waste Treatment Facility site (Figure 3-1). This wetland is a saturated, emergent wetland located on the western side of the site. The wetland has developed in a seep area, but there is wetland hydrology due to slowing of the water flow by a culvert under the old Melton Valley Road. Standing and flowing water were present in the wetland during the April 1999 site visit.

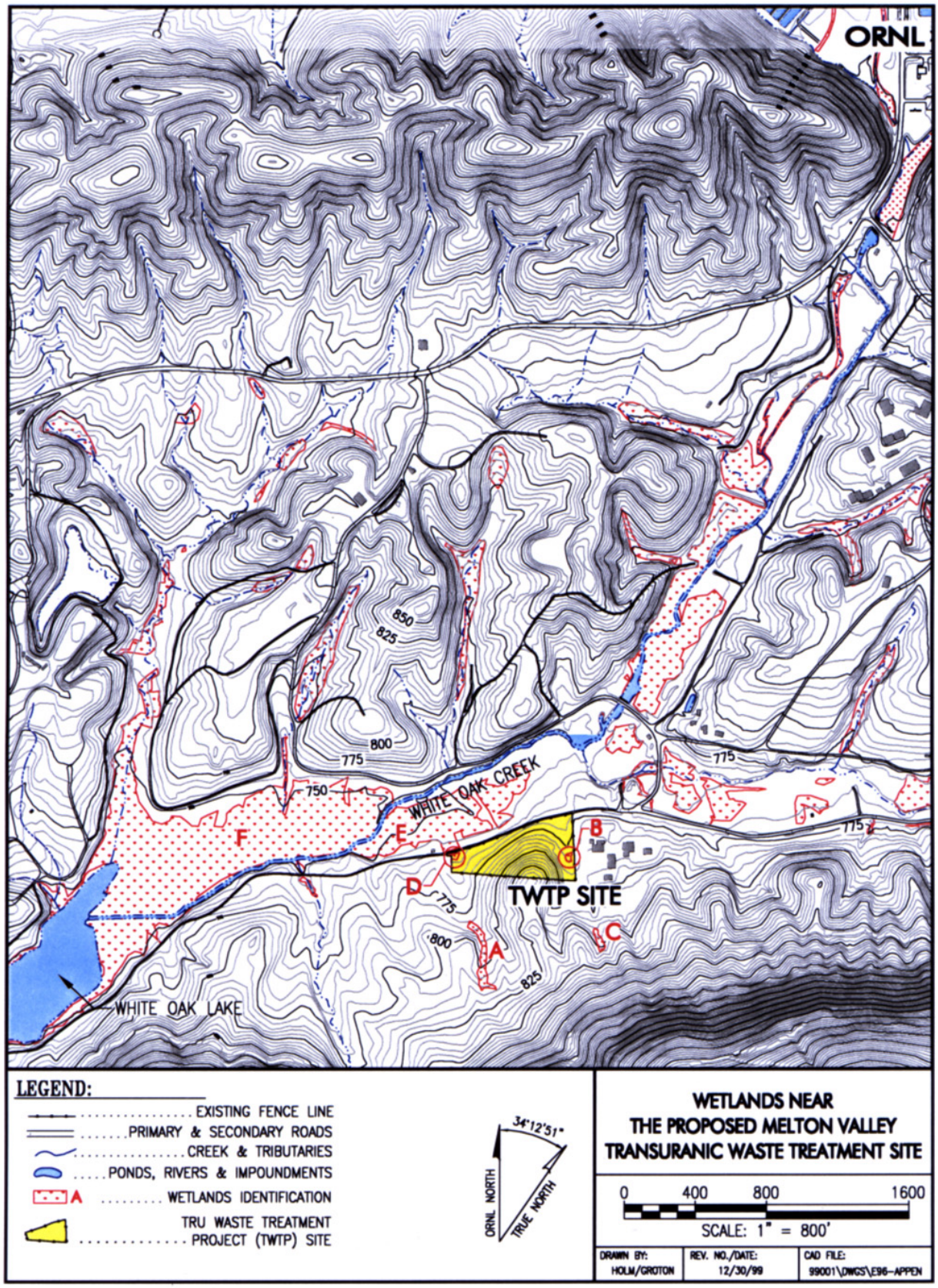


Figure 3-1. Wetlands near the proposed Melton Valley transuranic waste treatment site.

Wetland E includes most of the floodplain of Melton Branch north of the road along the northern perimeter of the proposed TRU Waste Treatment Facility (Figure 3-1). This wetland covers several hectares (acres). Because of potential radiological contamination of the floodplain soils, walkover and intrusive sampling of the floodplain area was not performed by Jacobs and Rosensteel (1999) or by SAIC in June 1999. This wetland was identified from National Wetland Inventory maps, which depict the area as palustrine forested wetland dominated by broad-leaved deciduous trees.

Wetland F includes the shoreline and upper reaches of White Oak Lake and covers several hectares (Figure 3-1). National Wetland Inventory maps depict this area as lacustrine wetland. The shoreline includes a mixture of trees, shrubs, and persistent and nonpersistent wetland plants.

THIS PAGE INTENTIONALLY LEFT BLANK

4. EFFECTS ON WETLANDS

4.1 WETLAND EFFECTS

This section discusses the environmental consequences to wetlands from the five alternatives evaluated for the proposed TRU Waste Treatment Project facility. Impacts from the construction, operation, and closure phases are discussed, as applicable, for each alternative.

4.2 NO ACTION ALTERNATIVE

Construction and closure phases are not applicable to the No Action Alternative; therefore, only potential impacts from the operation phase are discussed for this alternative.

Impacts to the six wetland systems should be negligible because essentially no wastes from the Melton Valley Storage Tanks would be released to reach the wetlands. In addition, no other activities would be conducted that would adversely impact the structure or functioning of the wetlands. However, radionuclide migration from waste in the unlined trenches at Solid Waste Storage Area 5 North (SWSA-5N) would potentially continue to pose some threat to Wetland F.

4.3 LOW-TEMPERATURE DRYING ALTERNATIVE

Environmental consequences for wetlands and floodplains for the Low-Temperature Drying Alternative include those associated with the construction phase, operations phase, and D&D phase. The environmental consequences associated with each phase are discussed below.

The construction phase impacts to Wetland B would be severe, and would result in a loss of 0.012 ha (0.03 acre) of wetland habitat. Current construction plans include diversion of the drainageway feeding Wetland B through a culvert, thereby removing the hydrologic source of the wetland. The wetland functions as a wet-weather or possibly permanent seep discharging into a small ravine. The small size and limited function suggest a relatively low value for the wetland. Impacts to Wetlands D, E, and F should be negligible as long as soil erosion is successfully controlled. In the worst case, if soil erosion is not controlled during the construction phase, Wetlands D, E, and F could be adversely affected short-term by excessive siltation, which would be detrimental to aquatic biota in the wetlands. Impacts to Wetlands A and C should be negligible because their locations are outside the areas to be cleared for construction and should not receive much deposition from soil erosion.

Impacts to wetlands from the D&D of the facility are expected to be negligible and generally similar to, or less than, those discussed for the construction and operation phase activities as long as on-site erosion is adequately controlled and no sediment migrates offsite.

4.4 VITRIFICATION ALTERNATIVE

Environmental consequences for wetlands and floodplains for the Vitrification Alternative include those associated with the construction phase, operations phase, and D&D phase. The environmental consequences associated with each phase are discussed below.

The construction phase impacts to Wetland B would be severe, and would result in a loss of 0.012 ha (0.03 acre) of wetland habitat. Current construction plans include diversion of the drainageway feeding Wetland B through a culvert, thereby removing the hydrologic source of the wetland. Impacts to Wetlands D, E, and F should be negligible as long as soil erosion is successfully controlled. In the worst case, if soil erosion is not controlled during the construction phase, Wetlands D, E, and F could be adversely affected short-term by excessive siltation, which would be detrimental to aquatic biota in the wetlands. Impacts to Wetlands A and C should be negligible because their locations are outside the areas to be cleared for construction and should not receive much deposition from soil erosion.

Impacts to wetlands from the D&D of the facility are expected to be negligible and generally similar to, or less than, those discussed for the construction and operation phase activities as long as on-site erosion is adequately controlled and no sediment migrates offsite.

4.5 CEMENTATION ALTERNATIVE

Environmental consequences for wetlands and floodplains for the Cementation Alternative include those associated with the construction phase, operations phase, and D&D phase. The environmental consequences associated with each phase are discussed below.

The construction phase impacts to Wetland B would be severe, and would result in a loss of 0.012 ha (0.03 acre) of wetland habitat. Current construction plans include diversion of the drainageway feeding Wetland B through a culvert, thereby removing the hydrologic source of the wetland. Impacts to Wetlands D, E, and F should be negligible as long as soil erosion is successfully controlled. In the worst case, if soil erosion is not controlled during the construction phase, Wetlands D, E, and F could be adversely affected short-term by excessive siltation, which would be detrimental to aquatic biota in the wetlands. Impacts to Wetlands A and C should be negligible because their locations are outside the areas to be cleared for construction and should not receive much deposition from soil erosion.

Impacts to wetlands from the D&D of the facility are expected to be negligible and generally similar to, or less than, those discussed for the construction and operation phase activities as long as on-site erosion is adequately controlled and no sediment migrates offsite.

4.6 TREATMENT AND WASTE STORAGE AT ORNL ALTERNATIVE

Environmental consequences for wetlands and floodplains for the Treatment and Off-site Storage Alternative include those associated with the construction phase, operations phase, and D&D phase. The environmental consequences associated with each phase are discussed below.

The construction phase impacts to Wetland B would be severe, and would result in a loss of 0.012 ha (0.03 acre) of wetland habitat. Current construction plans include diversion of the drainageway feeding Wetland B through a culvert, thereby removing the hydrologic source of the wetland. Impacts to Wetlands D, E, and F should be negligible as long as soil erosion is successfully controlled. In the worst case, if soil erosion is not controlled during the construction phase, Wetlands D, E, and F could be adversely affected short-term by excessive siltation, which would be detrimental to aquatic biota in the wetlands. Impacts to Wetlands A and C should be negligible because their locations are outside the areas to be cleared for construction and should not receive much deposition from soil erosion.

Impacts to wetlands from the D&D of the facility are expected to be negligible and generally similar to, or less than, those discussed for the construction and operation phase activities as long as on-site erosion is adequately controlled and no sediment migrates offsite.

THIS PAGE INTENTIONALLY LEFT BLANK

5. MITIGATION

Proposed mitigation measures to lessen the impact of construction in wetlands at the TRU Waste Treatment Facility site include standard construction practices, such as sediment control fences, to control and minimize erosion, runoff, and siltation of floodplain, wetland, and other water resources. DOE would identify and employ best management practices that would minimize adverse impacts during construction, including prevention of erosion and siltation into the wetlands and streams in accordance with standard U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), formerly Soil Conservation Service (SCS), methods or the equivalent. If needed, tracked excavating vehicles and pressure-reducing mats would be used to reduce the risk of compacting sediment or soil. Areas located in the wetlands adjacent to the TRU Waste Treatment Facility site would not be used for temporary or permanent storage purposes. However, adjacent areas within the wetland buffer zone may be used for temporary storage of excavated material and rubble awaiting final disposal at an appropriate facility. Upon completion of the remediation activities, all affected areas in wetlands, and the wetland buffer zone would be backfilled, regraded, and revegetated with noninvasive, native plant species.

Proposed construction would result in the draining of 0.016 ha (0.03 acre) in Wetland B. Mitigation for the loss of this wetland habitat may require compensatory mitigation. If needed, the sediment/stormwater detention basins could be designed as a constructed wetland to compensate for the loss of Wetland B.

THIS PAGE INTENTIONALLY LEFT BLANK

6. SUMMARY AND CONCLUSIONS

The preferred treatment action, Alternative 2, Low-Temperature Drying, proposed for the new TRU Waste Treatment Facility at the Melton Valley site would result in long-term impacts to one small wetland at the site. Construction of the new facility would effectively drain Wetland B, which covers an area of 0.016 ha (0.03 acre). Similar impacts to Wetland B would result from the implementation of Alternative 3, Vitrification; Alternative 4, Cementation; or Alternative 5, Treatment and Storage Elsewhere at ORNL.

If compensatory mitigation is required for the loss of this wetland, the sediment control/stormwater detention basin for the project can be designed as a wetland to replace loss wetland habitat and functions at the site. If this is not suitable mitigation would be accomplished through the development of replacement wetlands either elsewhere at ORNL or other Oak Ridge Reservation sites, or through wetlands banking. The use of best management practices to control erosion at the site should prevent any indirect adverse impacts from affecting other wetlands at the site.

Alternative 1, No Action, would not result in any direct adverse impacts to any of the wetlands associated with TRU Waste Treatment Facility site. However, radionuclide migration from waste in the unlined trenches at SWSA-5N would potentially continue to pose some threat to Wetland F.

THIS PAGE INTENTIONALLY LEFT BLANK

7. REFERENCES

DOE (U.S. Department of Energy) 1997. *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, U.S. Department of Energy, Washington, D.C., May 1997.

DOE 1998. *Safety Analysis Report for the Gunite and Associated Tanks Project Remediation of the South Tank Farm, Facility 3507, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, ORNL/ER-403, February 1998.

Federal Register 1999. Vol. 64, No. 17, pp. 4079–82.

Jacobs and Rosensteel (Jacobs Environmental Management Team and Barbara A. Rosensteel) 1999. *Findings of Wetland Delineation on the Proposed Transuranic Waste Facility Site in Melton Valley, Oak Ridge Reservation, Oak Ridge Tennessee*. August 25, 1999, 9 pp. plus appendix.

THIS PAGE INTENTIONALLY LEFT BLANK